MP3 Player Madness
We road-test 7 would-be iPod killers. Can any of 'em hang?

nVidia's Dual Card Shocker!
Two GeForce 6800s linked together! Exclusive details inside on page 12

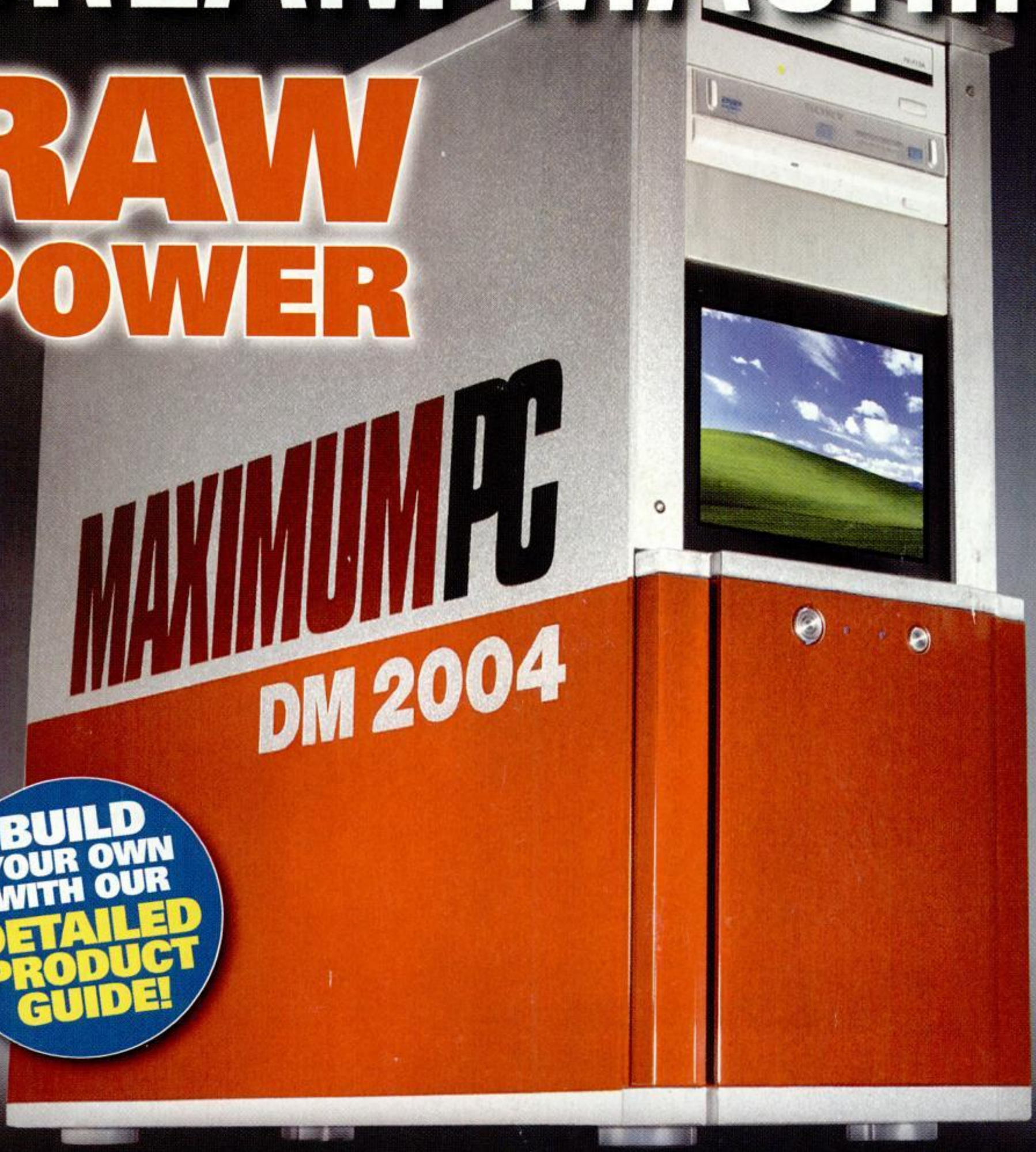
The Great Case Shootout
Looking for a new enclosure? We torture-test 12 of them!

MAXIMUM PC

MINIMUM BS • SEPTEMBER 2004

DREAM MACHINE '04

RAW POWER



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WARNING: ISSUE CONTAINS OVER 35 BRUTAL REVIEWS. CAN YOU HANDLE THE TRUTH?

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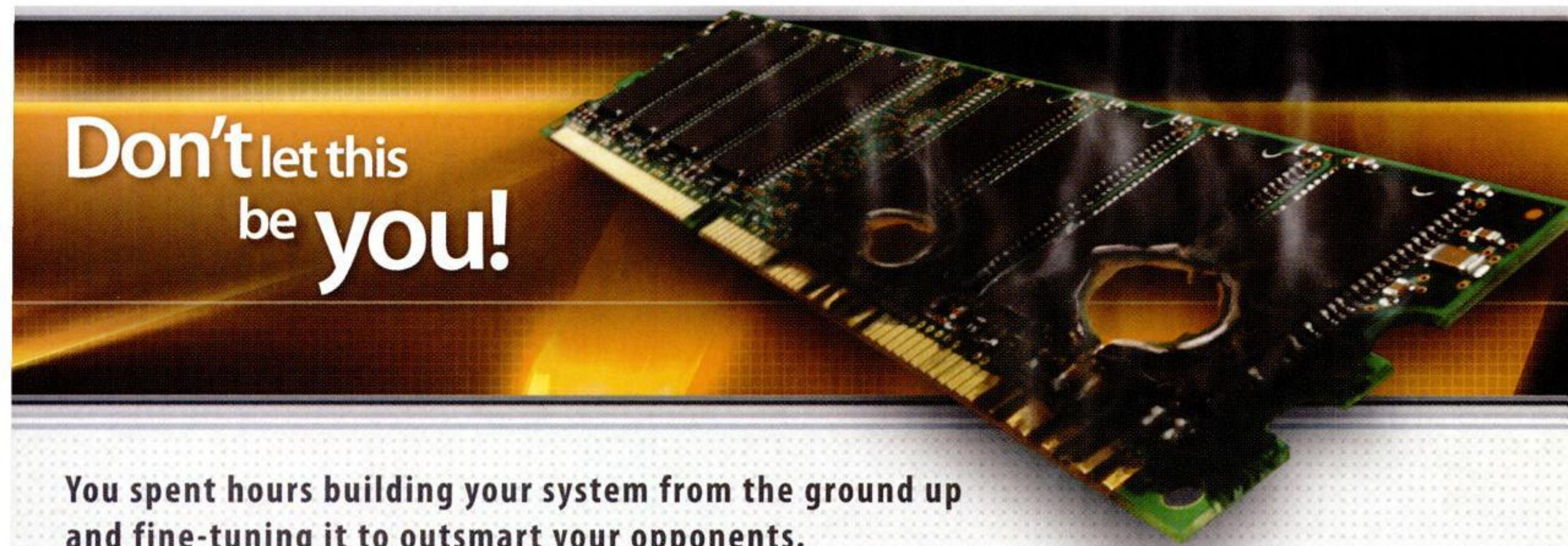

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To get more information about Ballistix™ including specifications, reviews, contests, and more visit:

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What Good Is Your Memory At 667MHz If It's Not Stable?

Memory is memory, right? Actually, no! Inferior memory modules can wreak havoc on your system. The blue screen of death, software crashes, driver and operating system hiccups—all can be caused by bad memory modules. And oftentimes, you don't even know it's the memory that's causing the problems. Do you really want to spend your precious computing time troubleshooting? Can you really afford to start from scratch?

As you increase the operating frequency of your FSB, the quality of the system components becomes increasingly important. When the FSB frequency increases, the allowable margin of error decreases, and a small variance outside accepted tolerance levels can result in stability issues and cause system problems like the ones mentioned above. As an enthusiast, you need memory that consistently meets the performance demands of your system.

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3. Prize: The winner will receive a prize consisting of: one (1) 'Dream Machine' gaming system valued at $4,999. The game system will include a Crucial Ballistix™ DDR2-powered Intel Pentium 4 LGA 775 PC, a monitor, 5.1 surround sound digital speakers, gaming software, gaming controllers, and headset. No transfer of prize permitted.

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Release Notes

Building a Dream

We see and build so many amazing PCs each year that the self-applied pressure to construct a better, faster, and more functional Dream Machine can get pretty intense. Here's a month-by-month breakdown of this year's tense decision-making process:

▶ **EARLY APRIL, 2004:** Yep, April. Three months prior to our deadline of July 9, Senior Editor Gordon Mah Ung first mentions the Dream Machine at our regular Monday staff meeting. "I'm not saying we need to finalize it now," he says, "But you better start thinking about it." After 60 minutes of heated discussion, the only thing we can agree on is that DM 2004 will feature a next-gen videocard. No problem—we have time.

▶ **EARLY MAY 2004:** Panic grips the staff. The cause of concern: Associate Editor Josh Norem's high-end PC upgrade in our July issue is faster than anything our Lab has seen. Gordon begins lobbying for his concept: a future-proof PC based on a PCI Express, DDR2-based mobo. Can we get the parts in time?

▶ **LATE MAY 2004:** Gordon's future-proof theme has garnered a majority of support. The harmony is disrupted, however, when a heated internal debate erupts over the CPU. The choice is between Intel's 3.4GHz P4 Extreme Edition and the more controversial 3.6GHz P4 Prescott. We decide to let Lab tests determine the winner. Surprisingly fast and more easily overclocked, the Prescott wins. Lab tests also reveal that Intel's onboard HD Audio still doesn't sound as good as Creative's Audigy 2 ZS Gamer soundcard.

▶ **EARLY JUNE 2004:** It feels like we're looking down from the top of a 300-foot roller coaster drop. We can't agree on a look for our case, until Features Editor Logan Decker takes matters into his own hands and sketches an abstract, postmodern design. Smooth Creations promises to deliver the finished case the very last week of production. That's close, but it works. Simultaneously, Technical Editor Will Smith spies Earth LCD's LCD touch screen. When it arrives, he'll have to Dremel and jigsaw the case to properly install it.

▶ **LATE JUNE 2004:** We catch wind of nVidia's dual-card solution (detailed on page 12). We beg the company to give us one for the Dream Machine. Alas, our hopes are dashed on the last day of June. It's not quite ready. Heartbreak ensues.

▶ **EARLY JULY 2004:** With pressure mounting—we have to start shipping the September issue to the printer on July 14—Gordon and Will make a last-second change. nVidia's GeForce 6800 vidcard is out. In its place: ATI's Radeon X800 XT Platinum Edition, which consumes only a single slot on our jam-packed mobo.

▶ **JULY 18, 2004:** Benchmarks reveal that DM2004 is fast—freaky fast. A tired celebration ensues. DM2005 is seven months away.

—GEORGE JONES
george@maximumpc.com

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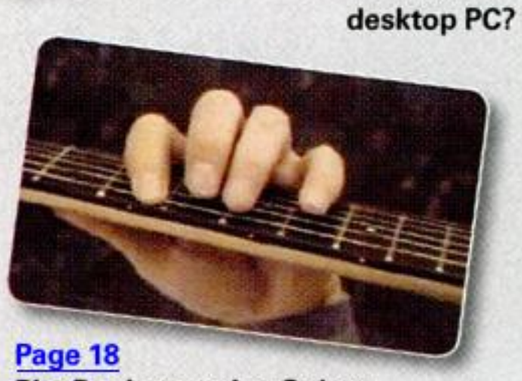

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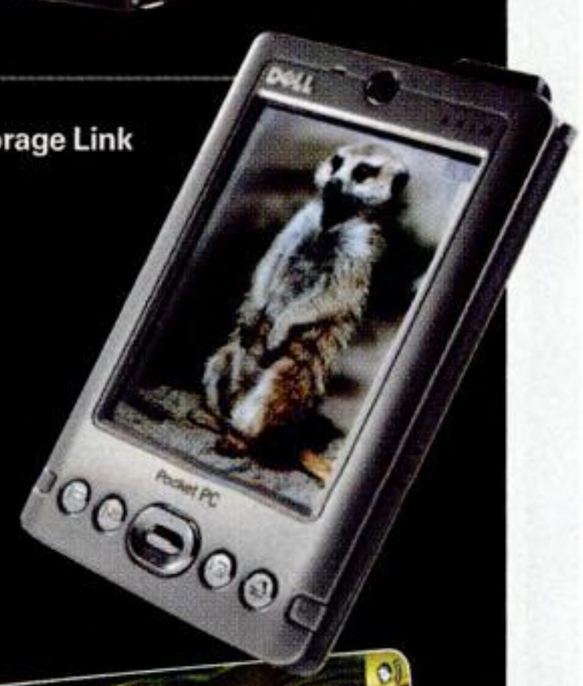

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Katherine Stevenson MANAGING EDITOR
Gordon Mah Ung SENIOR EDITOR
Will Smith TECHNICAL EDITOR
Logan Decker FEATURES EDITOR
Josh Norem ASSOCIATE EDITOR
Andrew Sanchez EDITOR EMERITUS

ART
Natalie Jeday ART DIRECTOR
Boni Uzilevsky ASSOCIATE ART DIRECTOR
Mark Madeo PHOTO EDITOR
Samantha Berg ASSOCIATE PHOTOGRAPHER

CONTRIBUTING EDITORS
E. Will Greenwald, Tom Halfhill, Tae Kim, Thomas McDonald

CONTRIBUTING WRITERS
Bryant Brabson, Omeed Chandra

PRODUCTION
Richard Lesovoy PRODUCTION DIRECTOR
Glenn Sadin PRODUCTION COORDINATOR

ADVERTISING
Chris Coelho PUBLISHER
Bernard Lanigan EASTERN AD DIRECTOR 646.723.5405
Dave Lynn WESTERN AD DIRECTOR 949.360.4443
Stacey Levy WESTERN AD MANAGER 925.964.1205
Anthony Danzi EASTERN AD MANAGER 646.723.5453
Nate Hunt NATIONAL ACCT MANAGER 415.656.8536
Jose Urrutia ADVERTISING COORDINATOR 415.656.8313
Kathleen Reilly MARKETING MANAGER

CIRCULATION
Tina K. Rogers CIRCULATION DIRECTOR
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Editorial staff input@maximumpc.com

FUTURE NETWORK USA
150 North Hill Dr. Brisbane, CA 94005
415.468.4684 www.futurenetworkusa.com

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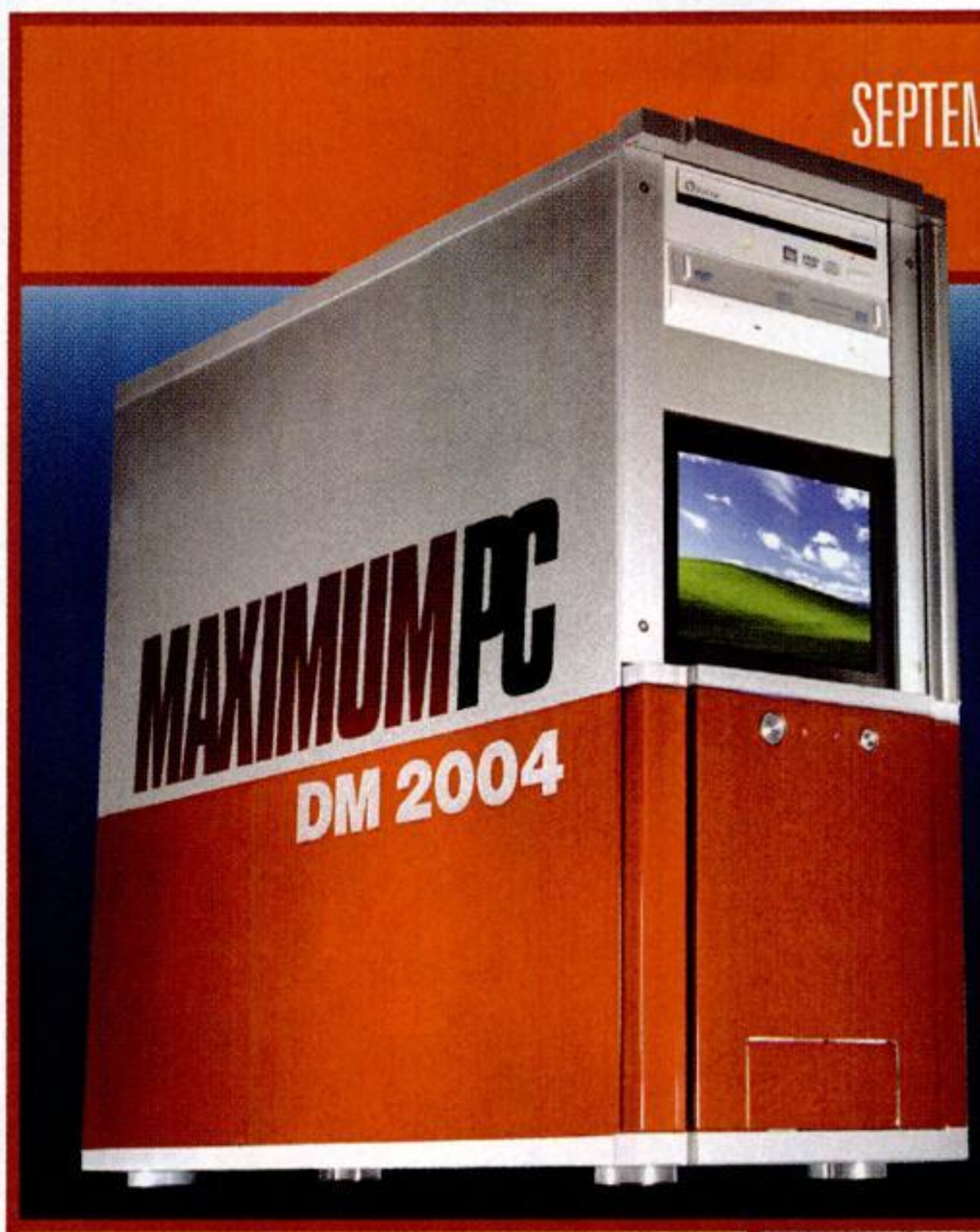

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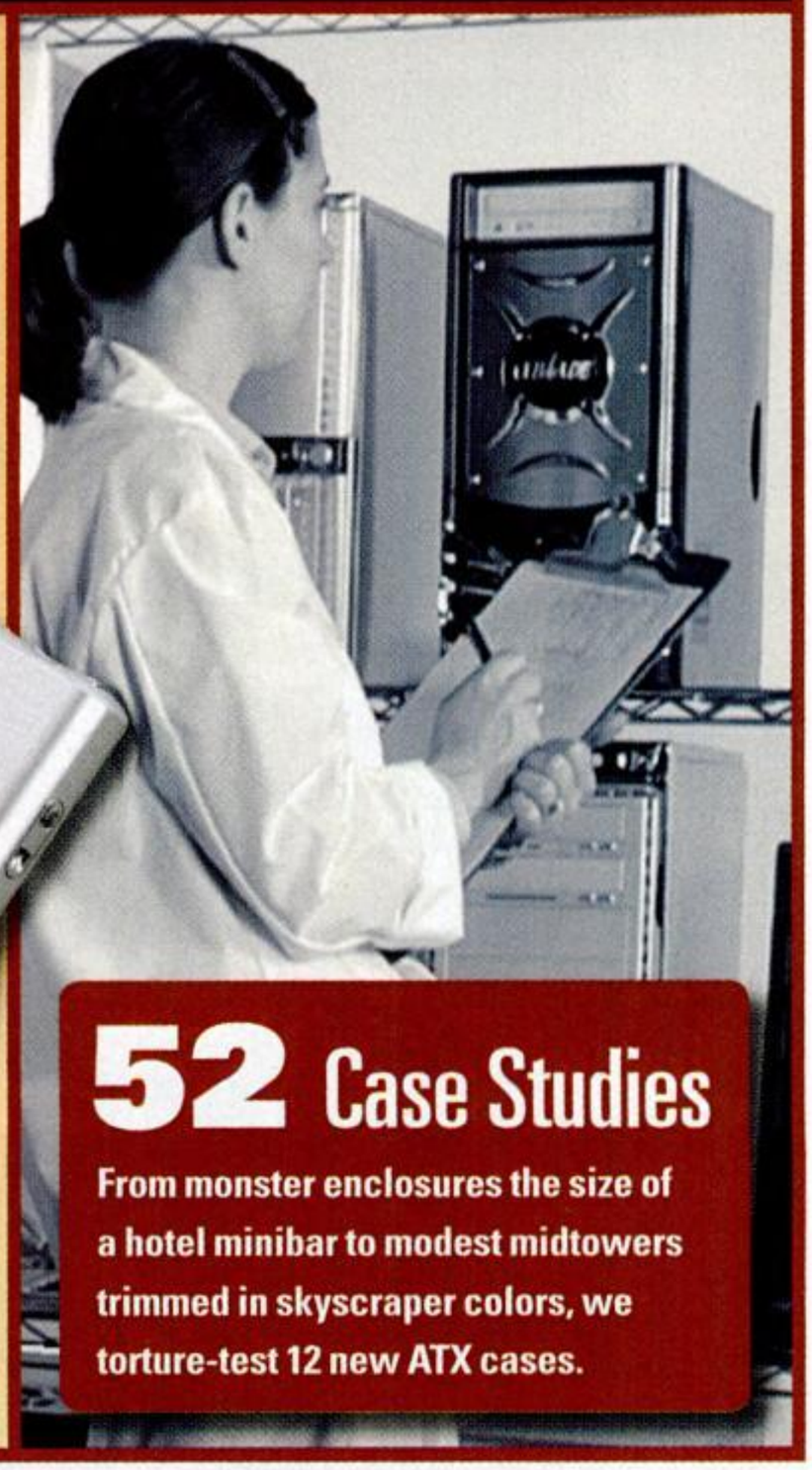

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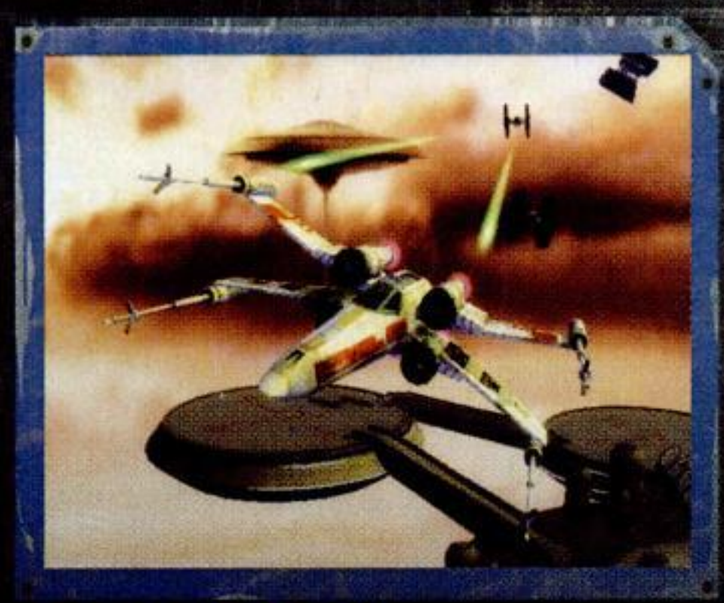

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In/Out

You write, we respond

MOZILLA? WHATEVER. TRY OPERA

What's the deal with the gushing outpouring of love for Mozilla's *Firefox* browser (August's "Browser Booster," page 34)? Sure, it might be better than *Internet Explorer*, but why have you consistently ignored the *Opera* web browser? Opera has been around longer than Mozilla. Plus, nearly every cool thing that *Firefox* does, *Opera* did years earlier.

—TIM HOSKINS

TECHNICAL EDITOR WILL SMITH RESPONDS: There's one simple reason: *Firefox* is free. *Opera* costs money. People aren't going to pay for a web browser, especially one that has problems consistently rendering web pages, as *Opera* does.

DUAL-LAYER DISCREPANCY?

I'm confused. In the August issue, you laud the Sony DRU-700A as "the first consumer-level burner to offer DVD+R dual-layer recording," but weeks before I got the issue I saw the NEC ND-2510A at Newegg.com for just $80. How can the Sony drive, which has the same specs, be noteworthy at nearly three times the cost?

—BEN SCHWAID

FEATURES EDITOR LOGAN "DOC OPTICAL" DECKER RESPONDS: I checked the NEC ND-2510A dual-layer burner you speak of, and it's what's known as an OEM (original equipment manufacturer) or "white box" version. OEM hardware is meant to be sold to PC manufacturers in vast quantities for inclusion in their PCs. But often resellers buy OEM equipment and sell them directly to consumers at what is often a substantial discount.

The drawback to buying an OEM part is that it's extremely unlikely you'll receive any software with your purchase—sometimes you won't even get the necessary drivers. Additionally, OEM parts are generally not supported or covered by the manufacturer's warranty. That's why these OEM versions are so much cheaper than their retail counterparts.

OEM products are often a great bargain (in this case, you might already have a disc burning application you're happy with and don't need the software that comes in a retail package). But make sure to confirm whether or not the store or web site you purchase an OEM product from offers technical support or, more importantly, a warranty.

IT *IS* POSSIBLE TO SEND UNTRACEABLE E-MAIL

This is in response to the August issue's "PC Urban Legends" story. The author argued that it's impossible to send an untraceable e-mail. I disagree—here's how to do it. Put on a fake beard, funny hat, and dark sunglasses. Go to the nearest Internet cafe. Pay cash to use a PC for a half-hour. Go to Yahoo. Sign up for free e-mail. Send your love letter, death threat, terrorism tip, whatever. The e-mail can be electronically traced to the café—but not to you. This also works at public libraries (no cash needed!), airports (put cash in the Internet terminal, not your credit card!). The physical disguise is for the omnipresent surveillance cameras.

—TOM WELSH

Senior Editor Gordon Mah Ung takes Tom Welsh's suggestion for sending untraceable e-mail a step further by typing with a rubber chicken to avoid leaving fingerprints.

EDITOR IN CHIEF GEORGE JONES RESPONDS: That's a great solution, Tom—and we have to agree that sounds pretty airtight, although we wouldn't recommend wearing a disguise to the airport these days. We also wouldn't recommend looking too suspicious… Senior Editor Gordon Mah Ung "went away" for a few weeks after donning the dubious disguise pictured above.

DON'T BLAME VIA FOR EXTERNAL DRIVER REQUIREMENTS

In your August issue review of Asus' A8V Deluxe Motherboard, I noted the following statement in paragraph five: "...sadly the VIA chipset still doesn't support native SATA devices. You'll still need a floppy drive and 'F6' drivers to install Windows XP."

I think you are making a mistake in blaming VIA for the requirement of external drivers. I believe the real problem is that the Windows XP installer kernel does not come with SATA support and requires that you load a kernel module that will allow it to interface with your SATA controller. Unfortunately, I believe that you will be installing "F6" drivers until Microsoft releases a new Windows installer.

As a side note, most Linux distributions based around the 2.6 kernel support SATA "out of the box" without the need for a third-party kernel module.

—ALEXANDER J. MAIDAK

SENIOR EDITOR GORDON MAH UNG RESPONDS: Actually, I think it's quite fair to blame VIA for not implementing its SATA support so you don't have to load additional drivers to get Windows XP working. You are correct, Windows XP doesn't natively support SATA storage devices, so you would have to load drivers to use, say, a Silicon Image SATA controller. However, Intel's and nVidia's chipsets with native support are implemented so you don't have to load F6 drivers. As a side note, we'll be running a how-to next month that walks you through the creation of a slip-streamed version of Windows XP so you can include all the drivers you want for your installer.

YOU ARE NO TREKKIE, SIR!

I just received the August 2004 issue of *Maximum PC* and was considering taking keyboard in hand to write a congratulatory e-mail on another fine issue, when suddenly, on page 57, disaster struck. While it was pleasing to note that the whiteboard has been erased of the bogus physics formula that has twice disgraced the pages of your magazine, at the bottom lurks the most heinous errors ever to see print in *Maximum PC*: You spelled Picard with more than one c!

—EARL EVERETT

EDITOR IN CHIEF GEORGE JONES RESPONDS: We're truly sorry about the error, Earl. To rectify the problem, we identified the offending editor and forced him to watch each and every episode of *Star Trek: The Next Generation*.

SERIAL-ATA PLEXY?

In the last issue, you guys did a review of the PlexWriter PX-712A DVD burner. However, on Plextor's web site and in other advertisements, I have also seen a PX-712SA Serial-ATA version. Could you perhaps do a review of that, or better yet, a side-by-side comparison?

—BRETT DUTRO

FEATURES EDITOR LOGAN DECKER RESPONDS: As both the IDE and Serial-ATA buses provide way more bandwidth than an optical drive could possibly hope to gobble up, there should be no performance difference—and no performance improvement—using one instead of the other. However, like you, we'd feel better with numbers to back this up. So we'll ask for both versions when Plextor delivers its next DVD burner. Stay tuned!

PCI EXPRESS QUESTIONS

Ever since Intel dropped the LGA775-expansion explosion on the PC community, everyone from ATI and nVidia to Alienware has gone crazy promoting PCI Express x16 Graphics, 925X, DDR2, and LGA775. Through all this hype I haven't heard a thing about PCI Express x1 expansion cards. I have a couple questions that I bet are not bugging just

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HOW MUCH FOR LAST YEAR'S DREAM?

I was browsing last year's Dream Machine issue (September 2003) when it struck me: How much would last year's ultimate machine cost today? I did a little research—here's what I found:

- **Case: $140**
- **Power supply: $219**
- **CPU 3.2GHz P4C: $277**
- **IC7-G mobo: $139**
- **Cooler: approx. $300**
- **Memory CMX512-4000PRO @$160 each: $320**
- **5900SE videocard: $202**
- **Audigy 2 ZS Gamer: $110**
- **CD-RW Plextor: $46**
- **DVD-R (A06 discontinued – A07 used): $119**
- **Media reader: $34**
- **2x WD360GD drives: $116**
- **2x WD2500JB drives: $175**
- **CRT (discontinued, so I selected the GDM-C520K): $1,599**
- **LCD: $1,400**
- **Speakers: $243**
- **Keyboard: $15**
- **Mouse: $49**
- **Cables: $10**
- **WinXP OEM: $141**

The total cost today for these components is $5,654, which is 48 percent less than it cost last year. If you eliminate the CRT and go with just the LCD, the price drops to $4,055. That's not too bad for one-year depreciation.

—CURTIS SPONSLER

me, but many of your readers: First, are there companies that have acknowledged working on the creation of PCI Express x1 cards? Second, will the short length of the connector port be a card-stability liability for large cards such as video-capture cards? And finally, how soon will the industry phase out the PCI slot? Will it be within two or more years, or sooner?

—TAYLOR SHULL

SENIOR EDITOR GORDON MAH UNG RESPONDS: A number of companies have told us they plan to or are exploring plans to make x1 PCI Express cards. Right now, it's mostly a chicken-and-egg situation; companies don't want to invest in making cards because there are very few motherboards out there to support them, and thus little demand.

Your question about card stability is a great one—we've been asking manufacturers the same thing for a few months now, and every vendor tells us that it won't be an issue. We're in your camp, however; we'll believe it when we see it. As for the lifespan of good ol' PCI, it will likely continue to be used in PCs for the foreseeable future. It took many, many years for ISA to go away, so we expect the same from PCI.

DO YOU KNOW YOUR DRIVE IMAGING?

You guys keep getting this one wrong, but I guess no harm has been done, because you are apparently unaware of the consequences. I have a machine with four Adaptec SATA RAID controllers. I have an eight-drive RAID 5 array, a four-drive RAID 10 array, several RAID 0 arrays, as well as a number of simple volumes. I'm running WinXP.

Norton Ghost offers no support for SATA as it says on its web site. They give you the option of trying it at your own risk. *DriveImage* by PowerQuest is at best a loser and at worst a drive killer. I tried to Image my RAID 0 boot array with *DriveImage 7* and it failed miserably. It even trashed my RAID 0 array!

With all of my data backed up, I decided to try *DriveImage 2002*, per your recommendation in the May issue (In The Lab, page 68). Upon starting the program, I got an error message from my Adaptec storage manager program. I closed down the system. When I rebooted, I discovered that *DriveImage* had destroyed both arrays on Controller 0, and was halfway through destroying the arrays on Controller 1 when I stopped it. The data on the RAID 5 and RAID 10 arrays was *not* recoverable, even with the assistance of Adaptec tech support.

There is good news: Acronis *True Image 7* is SATA and SATA RAID safe, at least on my system. I have successfully cloned my boot drive several times with it—and the cloned drives work perfectly. However, I could not image my boot drive to a RAID 0 array. But at least it didn't harm any of my arrays.

—DON PULITZER

ASSOCIATE EDITOR JOSH NOREM RESPONDS: Thanks for writing, Donald, and we appreciate the heads up about Acronis *True Image*. Regarding your comment that we're "apparently unaware" of the consequences of recommending bunk disk imaging software, our reaction is this: "As if!"

The entire point of the In the Lab segment you're referring to was to steer people away from programs that could cause problems with their hard drives. In the article, we related our experiences in cloning a boot drive to a Serial ATA hard drive, and only had success with PowerQuest *DriveImage 2002*. Your results were obviously different. As you stated in your letter, you're running RAID and using an Adaptec controller, so it's likely that one of those factors was the cause of the problem. Still, we'll take a look at the Acronis package and report our findings in a future issue.

Finally, we must also take issue with your statement that "*Norton Ghost* offers no support for SATA as it says on its web site." In the support section of Norton's web site, it clearly states under *Ghost 2003* that "Ghost is compatible with the new Serial ATA (SATA) standard." ■

LETTERS POLICY: *MAXIMUM PC* invites your thoughts and comments. Send them to **input@maximumpc.com**. Please include your full name, town, and telephone number, and limit your letter to 300 words. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

COMING NEXT MONTH

IN THE PLATINUM-PRO-ULTRA-EXTREME-TITANIUM OCTOBER ISSUE OF MAXIMUM PC

WINDOWS LONGHORN BLOWOUT

Currently under top-secret development, rumors galore have circulated regarding Microsoft's next-generation version of Windows—code-name Longhorn. *Maximum PC* separates fact from fiction in a comprehensive, tell-all feature.

HIGH-END GAMING PC ROUNDUP

We asked eight of the world's leading PC manufacturers to send us the fastest PCs they could build, and we'll pit them against each other in one dramatic, can't-miss, winner-take-all shootout.

NEVER PRESS F6 AGAIN!

Learn how to build a custom Windows XP install disk—complete with the latest Service Pack and drivers for your RAID or Serial ATA controller—in a classic *Maximum PC* How-To.

PLUS

A tense three-printer shootout, tough-love reviews of LGA775 mobos, hard drives, speakers, digital cameras, Wi-Fi gadgets, and more!

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QuickStart

The beginning of the magazine, where articles are small

nVidia Goes Dual Card

What's faster than one GeForce 6800 Ultra? *Two* GeForce 6800 Ultras!

In *Maximum PC's* May issue, we broke news of Alienware's mysterious new technology that promised to double gaming performance by pairing two identical PCI Express videocards and letting them split the workload. The Alienware solution requires a special box to combine the signals from both cards into a single signal that any monitor can understand. Four months later, nVidia has announced its own dual-card solution, one that is even more promising because it does the exact same thing—without the special box.

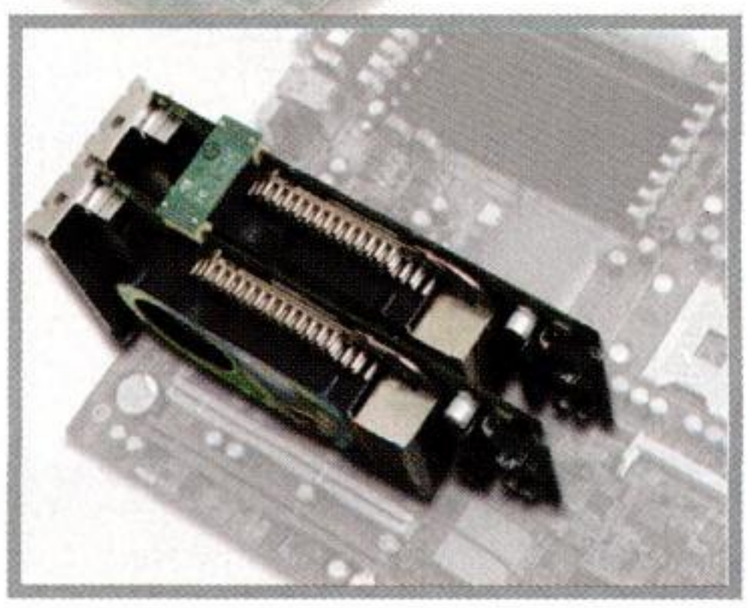
Like the Alienware rig, nVidia's dual-card solution requires two PCI Express cards and a special Intel Tumwater motherboard, required because the Alderwood 925X chipset includes just 16 high-speed PCI Express lanes to its north bridge chip, whereas Tumwater has 24 high-speed lanes. (In order for a Tumwater board to work properly, it needs two physical x16 PCI Express slots, even if one of them is running at just x8 speeds.)

Instead of using a special signal-combining box, nVidia uses a high-speed internal connector on the videocards that allows them to share necessary information. While nVidia wouldn't tell us exactly how fast the interconnect between the two cards is, we feel that using a dedicated bus rather than leftover PCI Express bandwidth should keep information flowing between the cards without robbing vital bandwidth between them and the rest of the system.

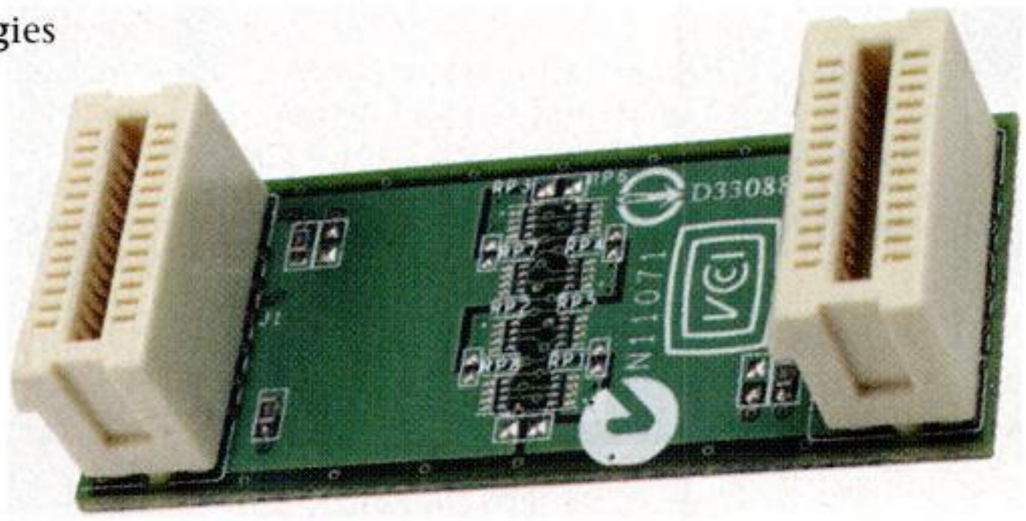
We haven't gotten our hands on the new connector yet, but based on photographs we've seen, it looks like nVidia is using an actual board made of silicon to connect the two graphics accelerators. Be warned, however, that this setup may be the cause of some seriously slotty behavior. Because each GeForce 6800 Ultra takes up one PCI Express slot and blocks a regular PCI slot, this configuration will consume a whopping total of *four* slots!

Of course, the big question is: How will the two competing technologies from nVidia and Alienware perform? nVidia claims its dual-card solution runs almost twice as fast as a single PCI Express 6800 board. We have no reason to doubt that. Our hunch is that the nVidia solution will actually be faster than Alienware's rig simply because the nVidia cards will use the custom interconnect to communicate, instead of competing with the rendering processes for bandwidth across the PCI Express bus.

We expect to have a dual-PCI Express rig in the Maximum PC Lab for testing next month. Stay tuned for the results!



The secret weapon of nVidia's dual-videocard rig is the as-yet-unnamed bridge chip, which you can see straddling the gap between these two GeForce 6800 Ultras.



This is the SLI connector, which creates a high-speed interconnect between the two PCI Express cards. Note that the two connectors are a fixed distance apart, so you need a mobo with the right configuration of PCI Express slots.

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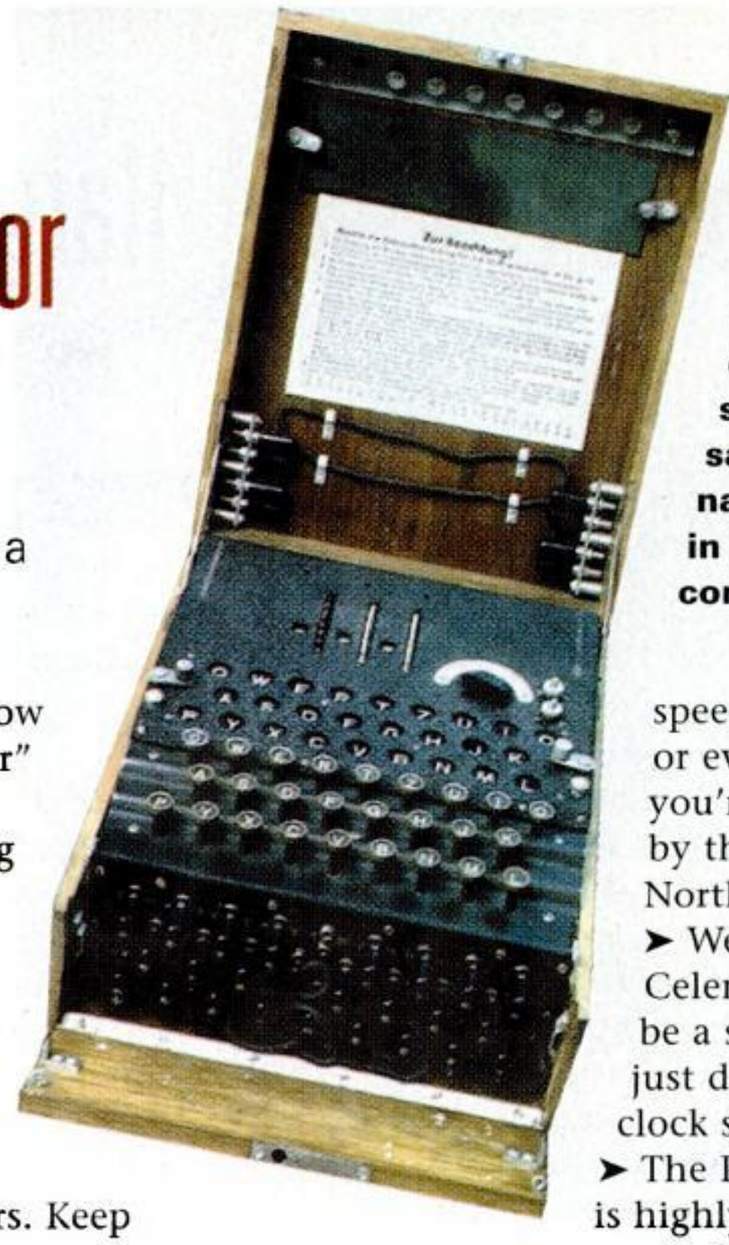
Maximum PC Intel Processor Decryption Guide

Confused by Intel's new naming scheme? Here's a handy cut-out guide for easy reference



The Enigma Machine was capable of generating 150 quintillion possible solutions—about the same number of CPU names Intel is using in its new naming convention.

If you think Intel's new processor naming scheme sounds indecipherably insane, you're not alone. Even Intel admits the model numbers in this new convention are practically random. However, the company did tell us that the factors determining a CPU's model number include: architecture, cache, clock speed, frontside bus, and "other." Other? To us, this is akin to saying the number is based on clock speed, cache, and the pounds of butter the average Rhode Islander consumes. The key concept Intel wants you to remember is this: The higher the processor number, the better it is. But how you define "better" depends on how you plan on using your PC.

To save you numerous hassles, we put together a handy chart to decode Intel's processor numbers. Keep these thoughts in mind as you shop for your new CPU:

➤ Generally, Prescott P4s (any of the enhanced NetBurst CPUs) are better at higher speeds. At low speeds, like 2.4GHz or even 2.80GHz, you're better served by the old reliable Northwood P4 core.

➤ We fear the Celeron 320 D could be a serious dog. It just doesn't have the clock speed.

➤ The Pentium M core is highly efficient at most office productivity apps, and the higher speeds are generally better. But even at low clock speeds, the Pentium Ms are pretty speedy.

DESKTOP

PROCESSOR NUMBER	FAMILY	HYPER-THREADING	CLOCK SPEED	FSB	CACHE	PROCESS	ARCHITECTURE	INSTRUCTIONS
560	Pentium 4	Yes	3.60GHz	800MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
550	Pentium 4	Yes	3.40GHz	800MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
540	Pentium 4	Yes	3.20GHz	800MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
530	Pentium 4	Yes	3.00GHz	800MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
520	Pentium 4	Yes	2.80GHz	800MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
335	Celeron D	No	2.80GHz	533MHz	256KB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
330	Celeron D	No	2.66GHz	533MHz	256KB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
325	Celeron D	No	2.53GHz	533MHz	256KB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
320	Celeron D	No	2.40GHz	533MHz	256KB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3

MOBILE

PROCESSOR NUMBER	FAMILY	HYPER-THREADING	CLOCK SPEED	FSB	CACHE	PROCESS	ARCHITECTURE	INSTRUCTIONS
755	Pentium M	No	2.0GHz	400MHz	2MB L2	90nm	Pentium M	MMX, SSE, SSE2
745	Pentium M	No	1.80GHz	400MHz	2MB L2	90nm	Pentium M	MMX, SSE, SSE2
735	Pentium M	No	1.70GHz	400MHz	2MB L2	90nm	Pentium M	MMX, SSE, SSE2
725	Pentium M	No	1.60GHz	400MHz	2MB L2	90nm	Pentium M	MMX, SSE, SSE2
715	Pentium M	No	1.50GHz	400MHz	2MB L2	90nm	Pentium M	MMX, SSE, SSE2
538	Mobile Pentium 4	Yes	3.20GHz	533MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
532	Mobile Pentium 4	Yes	3.06GHz	533MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
518	Mobile Pentium 4	Yes	2.80GHz	533MHz	1MB L2	90nm	Enhanced NetBurst	MMX, SSE, SSE2, SSE3
340	Celeron M	No	1.50GHz	400MHz	512KB L2	130nm	Pentium M	MMX, SSE, SSE2
330	Celeron M	No	1.40GHz	400MHz	512KB L2	130nm	Pentium M	MMX, SSE, SSE2
320	Celeron M	No	1.30GHz	400MHz	512KB L2	130nm	Pentium M	MMX, SSE, SSE2
310	Celeron M	No	1.20GHz	400MHz	512KB L2	130nm	Pentium M	MMX, SSE, SSE2

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FAST FORWARD BY TOM R. HALFHILL

Is RFID Paranoia Rational?

Privacy is becoming as scarce as virginity. Security cameras are sprouting up everywhere, cellphone cameras are invading our health clubs, spyware programs are probing our hard drives, automotive black boxes are recording our driving habits, and dumpster divers are stealing our identities. Now comes the latest technology for chipping away at privacy: tiny chips called RFID tags hidden inside the products we buy.

RFID (radio-frequency identity) tags are promoted as a better way of identifying products than old-fashioned bar codes. The tiny chips are embedded in the product itself or the packaging. A special radio scanner can detect an RFID tag and read the data it contains: an inventory code, manufacturer code, shipping code, retail price, or just about anything. RFID tags are supposed to make inventory tracking and retail checkout more efficient, thereby saving money that can be passed along to consumers. They might even make checkout lines obsolete.

Whoa, say privacy advocates. RFID tags can also compromise our privacy, because often they aren't deactivated after checkout. Anybody with an RFID scanner could retrieve the data, maybe years later. Conspiracy theorists suggest even more frightening possibilities: enemy soldiers could locate our tanks by scanning for their RFID-tagged ammo; stalkers could more easily follow their prey; government agents could bug everything you buy; pickpockets could find tourists carrying RFID-chipped passports; terrorists could make bomb detonators that wait for crowds of people wearing RFID-tagged clothing to pass nearby.

Most of those fears don't make sense. RFID chips have very limited range—from a few inches to a few feet—because they lack a power source and have antennas smaller than those on many insects. (Some RFID chips look like specks of dust.) Amazingly, these tiny chips draw power not from a battery, but from the scanner that reads them. The scanner's RF radiation contains just enough energy to stimulate a weak signal from the chip.

In other words, RFID chips are momentary transponders, not constant transmitters, and their signals are feeble. To stalk someone wearing an RFID chip, you would have to be almost close enough to touch them. To find a tank by scanning for its RFID-tagged ammo, you would have to be inside the tank.

Nevertheless, it wouldn't hurt to disable an RFID tag once its job is done. I foresee a lively business in RFID zappers that emit bursts of RF radiation or electromagnetic pulses to fry the evil little chips. Just make sure to keep the zappers away from your digital devices.

Tom Halfhill was formerly a senior editor for Byte *magazine and now an analyst for* Microprocessor Report.

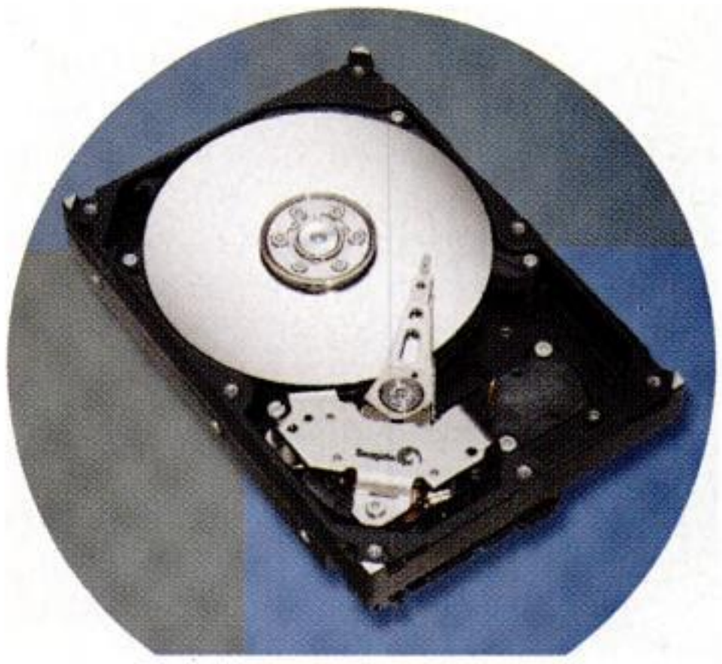
Hard Drives Gone Wild!

Seagate brazenly exposes more than a dozen new and improved drives

Remember the last time Seagate launched an entirely new product line? Neither do we, which is why Seagate's recent announcement of across-the-board updates and revamps—as well as several entirely new hard drives—is big news indeed. Read on for the most pertinent details on Seagate's most pertinent products. Most of these products will be out this fall.

Barracuda 7200.8

Compared with the seventh-generation drive released in 2003, the eighth-generation 400GB Barracuda sports 150GB more capacity while using the same three-platter design. It also offers double the amount of cache at 16MB and will be the first Serial ATA drive to ship with Native Command Queuing (NCQ). This queuing technology improves performance by allowing the drive to re-order commands in the manner it deems most efficient (this feature must be supported by the host controller, however). Available in both Serial ATA and ATA/100 interfaces, the 7200.8 drive will also be released in smaller capacities with less cache, but the fully loaded version will challenge the likes of Maxtor's DiamondMax 10 and Western Digital's 74GB Raptor.



The .8 in the name means eighth-generation. With a 16MB cache and Native Command Queuing, could this be Seagate's lucky number?

Momentus 7200.1

Hitachi's luscious 7,200rpm 7K60 2.5-inch hard drive has reigned supreme in laptop land for some time now, but Seagate is looking to change all that with its 100GB Momentus 7200.1 drive. This is Seagate's first-generation notebook drive—hence the .1 at the end of its name—but with a capacity of 100GB and a 7,200rpm spindle speed, it has already spanked the 60GB Hitachi drive, at least as far as specs go. Like the 7K60, it also sports an 8MB buffer, and will be available in both ATA and Serial ATA configurations.

Seagate hopes to dominate the high-end notebook market with this new 100GB, 7,200rpm drive.

5GB Pocket Drive

Inside Seagate's Pocket Drive is the ST-1, a brand-new 1-inch 5GB hard drive the size of a Compact Flash card. It's the first significant competitor to Hitachi's 4GB MicroDrive.

The Pocket Drive conceals a USB connector that uncoils and then retracts back into the drive's puck-shaped body.

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Hands on Microsoft's Windows Media Player 10

Microsoft's new player tells us much about the future of digital downloads

We copped a feel of the technical beta of Microsoft's *Windows Media Player 10*, and beneath the slick new interface we found a *Crying Game*-scale surprise that has the potential to lure insatiable music grazers away from *iTunes* (which has now sold more than 100 million tracks).

On the surface, the player itself has been shined to a high gloss with a three-paned window that offers a familiar directory tree metaphor for accessing songs and playlists, as well as grouping similar types of media (like video and television recordings). The presence of the player's new third window pane allowed us to constantly keep track of playlists or to-burn lists while sorting through our media library. Also new to the mix: the ability to quickly and easily change metadata such as genre or artist name for songs.

Another addition that should please people whose MP3 players force them to use hostile proprietary software is the new *Media Player's* Media Transfer Protocol. Also known as MTP, this generic bidirectional transfer protocol will allow compatible MP3 players to easily exchange and synch files using *Media Player 10*. Microsoft expects most major manufacturers to release firmware updates that include MTP for already-released players.

Like *iTunes for Windows*, *Windows Media Player 10* also acts as a front-end for purchasing and managing the music and movies you download from a variety of online services. Napster and CinemaNow are confirmed participating sites, and you can expect MSN's upcoming music service to be on the menu as well. Not surprisingly, Apple's iTunes service will not be supported.

The addition of Microsoft's digital rights management software, previously code-named *Janus*, paves the way for a more appealing alternative to single-track purchases. Under what is now referred to as Windows Media DRM 10 for Portable Devices, users will be able to download as many tracks as they want to DRM-based music devices through participating online services (like Napster and CinemaNow) for a monthly subscription.

It remains to be seen exactly how this will be implemented on the hardware side and under what policies. As an example, *Janus* gives content providers the ability to make music and movies "expire" after a specified period of time, so one possibility is that music services could allow you to "rent" entire albums or other content. It's unclear, however, whether or not DRM-compatible players will play your own "unauthorized" downloaded content.

The *Media Player 10* beta can be downloaded at: **www.microsoft.com/windows/windowsmedia/mp10/**. But keep in mind that it cannot be uninstalled through Add/Remove Programs; you'll have to use a restore point if you want to go back to your old player.

It appears that Redmond is feeling the heat from *iTunes*—*Windows Media Player 10's* three-paned interface makes searching through tracks and building playlists much easier than the previous version.

GAME THEORY

BY THOMAS L. McDONALD

Guys in Tights Save the Day

Let's face facts: Massively multiplayer gaming was getting stale. Fantasy-based, ersatz Tolkien questing had the genre by the neck and was shaking it like a Rottweiler with a chew toy. While *Worlds of Warcraft*, *Everquest II*, and even *Middle Earth Online* are certainly enough to get our attention, they're accompanied by this creeping sensation of familiarity. Oh joy, I get to start a brand-new elf character and begin the never-ending quest to pump stats as I quest for the missing Bronzed Crotch-plate of the Grand Chyyklyt in the Land of Ytmie. Please kill me now.

Gamers wishing for a brighter future saw those hopes dashed more than a year ago when *Star Wars Galaxies* turned out to be a colossal bore. We'd hoped for something fresh and exciting, but we got a wet noodle. *Everquest* with Wookies. Was MMO gaming destined to remain stuck in a Sony Online rut?

Despite the best efforts of mainstream publishers, the answer is no. Cryptic Software shopped its work-in-progress, the hit MMO game *City of Heroes*, for several years, only to be greeted by the deafening-silence-aside-from-chirping-crickets sound usually reserved for Daffy Duck. A hero game without recognizable heroes? I say, are you daft, man? Who would be interested in the blasted thing?

Actually, just about everyone. *City of Heroes* is, if not the savior of massively multiplayer gaming, at least a buff EMS medic who has applied some much-needed CPR. The genius of the game is that it simultaneously expands and simplifies the character creation process. In contrast to the "more is better" theory of character building, *CoH* gives gamers fewer powers and modifiers, but makes them all count. Most gamers wind up using only a few powers anyway, making the rest just so much background noise. Marry that accessibility to the most deliriously entertaining character creation process in memory and the natural love of superheroes, and you have the most purely entertaining MMO to date.

And no one wanted it. In a poetic turn of events, only Richard Garriott, now teamed with Korea's NCSoft, saw the potential of the game. The man who launched the modern massively multiplayer gaming genre with *Ultima Online* (only to see EA leave his baby out in the cold to wither and die) once again has proven he has the vision others lack. Everyone had a chance to take a bite of the *CoH* apple, and they all passed, all except Garriott. You see, it's not the talent or even the vision that's missing from computer and online gaming development today. It is, quite simply, the balls to do something about it.

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

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TechnoFile

Quick takes on technology trends

Sony's VAIO-U Series

Suffering from CGF (chronic gadget fatigue)? Debilitated by OSD (obsessive syncing disorder)? Relief has just arrived from Japan, and the therapy is so sexy, *Maximum PC* strongly recommends that readers with a predilection for gadget lust use extreme caution when viewing these images.

Casually brushing aside hardware "previews" from companies like OQO and FlipStart, Sony's VAIO-U series is the first to actually make good on the promise of a handheld device that's powerful enough to run the full desktop version of Windows XP. The VAIO-U effortlessly transitions from a handheld (with its integrated touch screen) to a laptop (with the included folding keyboard) to a desktop system with a port replicating-dock attached to your external display and keyboard.

While Sony has no immediate plans to market the VAIO-U series outside of Japan, the good folks at Dynamism have craftily smuggled them into the US. This means that if you took out a life-insurance policy on your PDA, now's the time to cash it in.

$2,000 (U50 model with 900MHz Celeron proc and 256MB RAM), www.dynamism.com.

Handheld, laptop, desktop system, and portable media center all rolled into one luscious-to-look-at package, Sony's VAIO-U series is steeply priced, but—finally!—delivers a single, do-everything device.

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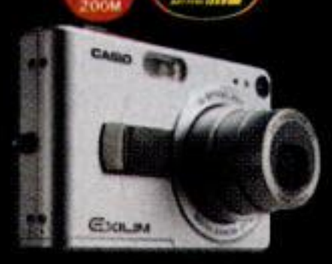
EX-S3
3.2 MEGAPIXELS



EX-Z30
3.2 MEGAPIXELS

EX-P600
6.0 MEGAPIXELS

*2.5 times the battery life of current CASIO cameras (comparison between EX-Z4U and EX-Z40)
*CIPA standard for battery life indicates 360 photos on a single charge. Image on camera LCD simulated

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Head2Head

A showdown among natural PC competitors

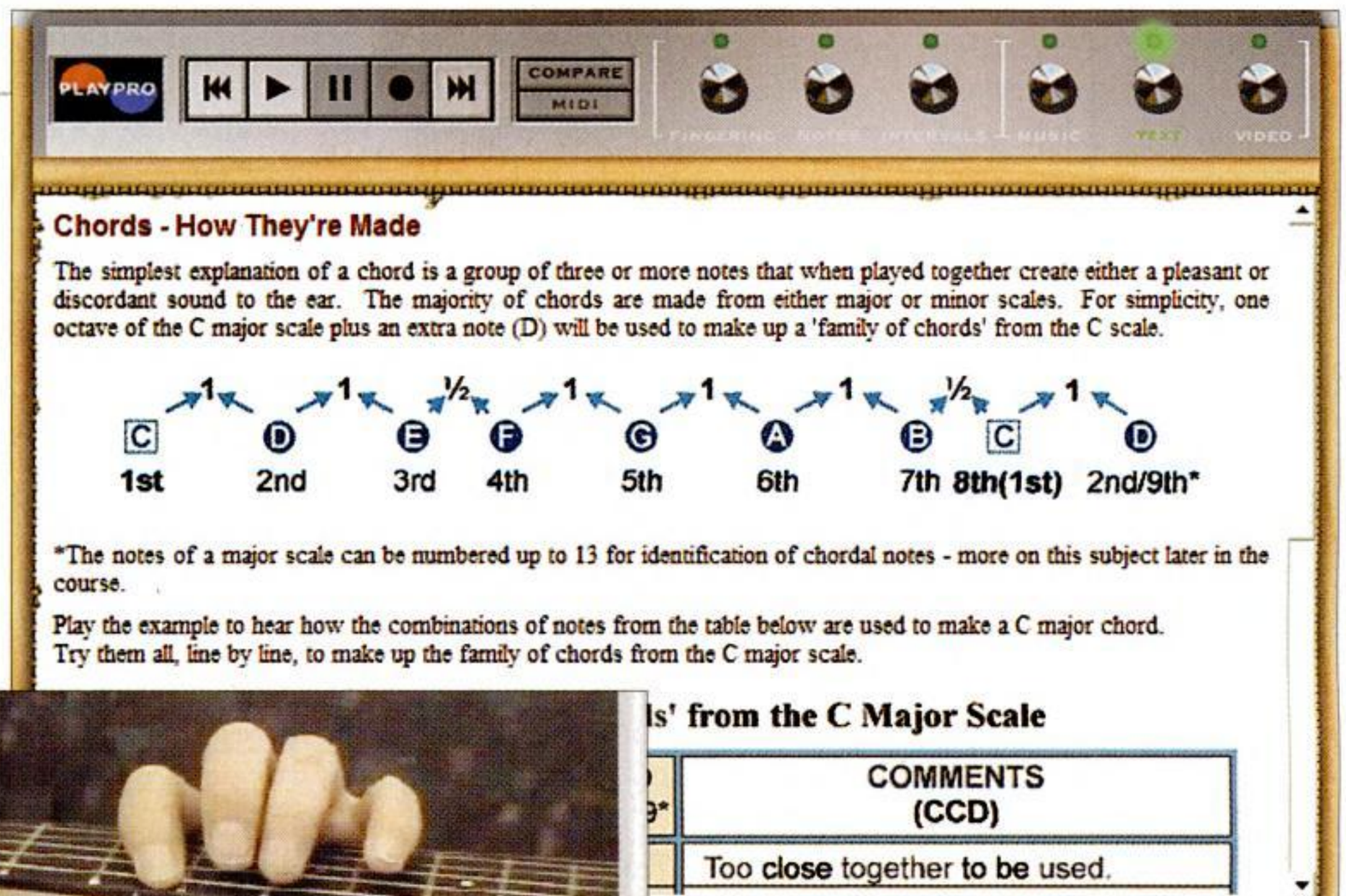
THIS MONTH: Guitar Software!

It's a well-known fact that girls like guys who can play guitar. Why else would almost every lonely college student make at least a halfhearted attempt to learn "Tears in Heaven"? Of course, most wannabe guitarists quickly abandon all hope of ever rivaling Eric Clapton upon discovering the sad truth that playing the guitar is hard. It takes a lot of patience and dedication, and yes, your fingers will hurt until you develop calluses.

Fortunately, we have some good news. Armed with the right software, you can master the guitar from the comfort of your very own PC. This month, we pit PlayPro's *Interactive Guitar* against eMedia's *Guitar Method,* two packages that promise to eliminate much of the frustration and tedium that make the learning process so unappealing. Read on for the results.

—OMEED CHANDRA

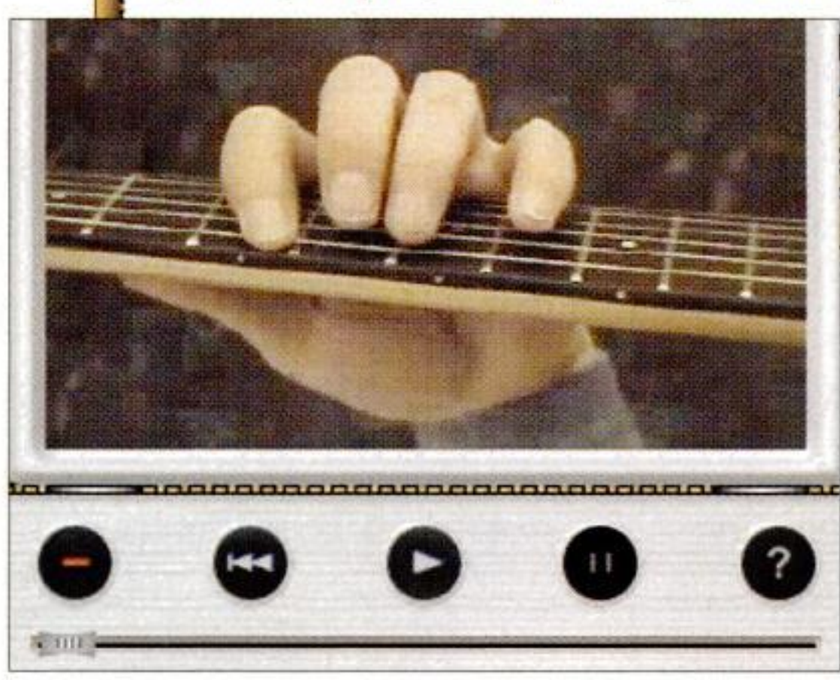
PLAYPRO INTERACTIVE GUITAR



Basic instruction: PlayPro's software thoroughly covers all the basic instructions, and even points out common pitfalls for beginning guitarists. The music you're supposed to play is simultaneously displayed in both musical notation and, for those who can't read music, tablature. However, eMedia's superior multimedia integration makes learning the basics less painful and more fun. **Winner: eMedia Guitar Method**

Intermediate/advanced instruction: Rather than making you shell out an extra 50 bucks to learn more advanced guitar techniques, PlayPro offers everything in a single package. Plenty of intermediate and advanced material is covered, including string bending, vibrato, hammer-ons and pull-offs, finger tapping, and more. *Interactive Guitar* also delves into elementary music theory, helping to mold you into a well-rounded musician instead of just a two-bit hack. **Winner: PlayPro Interactive Guitar**

Multimedia features: Like eMedia's *Guitar Method,* the PlayPro software boasts a plethora of instructional videos and audio clips, as well as an animated fret board that plays along with the examples so you can see the correct fingering. Meanwhile, the innovative "Comp-U-Pare" technology compares your playing with the examples and offers advice on how you can improve. *Interactive Guitar* also comes with two audio CDs with additional sound clips of the techniques taught in each lesson, so you can practice on the go. Unfortunately, most of PlayPro's multimedia features aren't integrated into the lessons as smoothly as eMedia's are. **Winner: Tie**



Ease-of-use and interface: *Interactive Guitar* unnecessarily surrounds itself with a vast black border that prevents you from seeing any other windows while you have the app open. Meanwhile, the interface tries to be clever (for instance, the lesson window is supposed to look like an amp—cute), but ultimately winds up frustrating to use. Learning to use the PlayPro software is about as fun as repeatedly slamming your hand in a car door, and feels all the more excruciating next to eMedia's user-friendly approach. **Winner: eMedia Guitar Method**

Reference tools: As a nice bonus, *Interactive Guitar* ships with a book that includes every lesson in printed form, which is handy if you're on the road or don't have a computer near your practice area. Unfortunately, while PlayPro does teach you how to figure out any chord on your own, its list of preformed chords is not nearly as comprehensive or accessible as eMedia's. **Winner: Tie**

MAXIMUM PC VERDICT 7

+ MOTOWN
Covers beginning to advanced topics, emphasizes technique, and includes lots of multimedia features.

− O-TOWN
Poorly designed interface, some multimedia features seem tacked on, and it doesn't teach you any songs.

$50, www.playprosoft.com

Copyrighted material

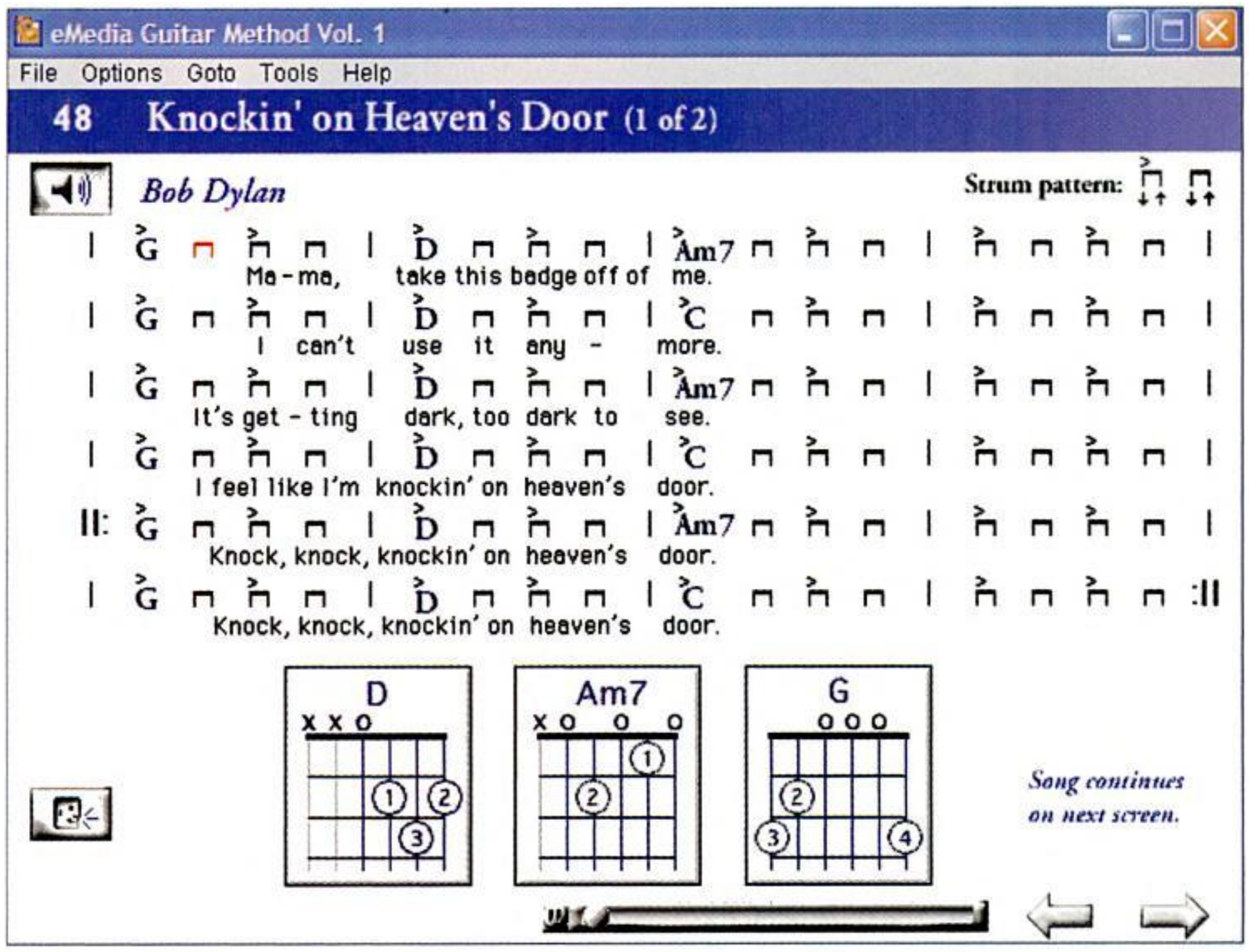
EMEDIA GUITAR METHOD VOL. 1

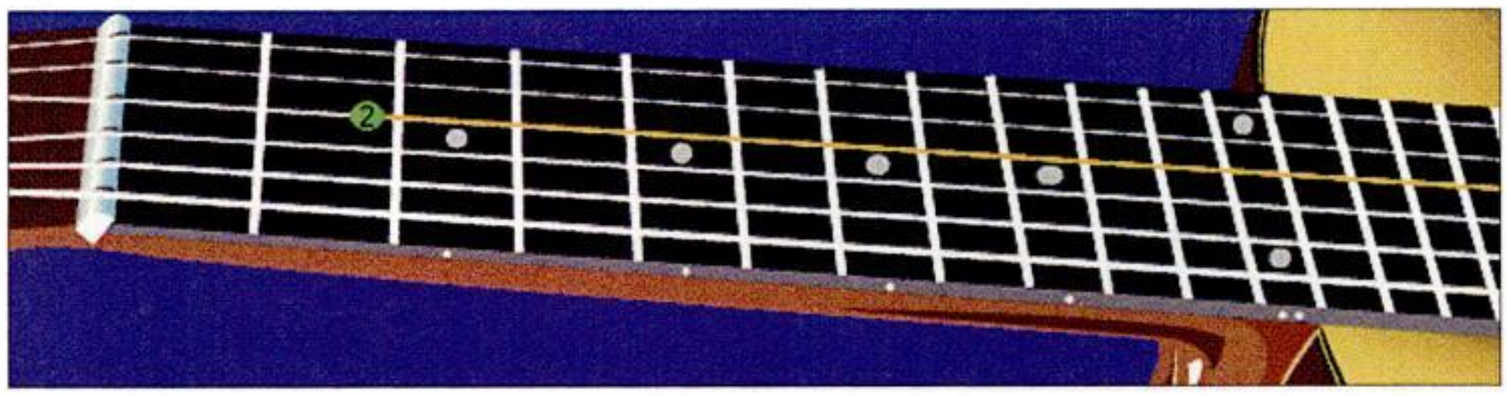
Basic instruction: eMedia introduces the basics of playing the guitar in a simple and straightforward manner. The software can be configured to display music in either tablature or musical notation, and *Guitar Method's* extensive use of song-based instruction helps make the learning process more interesting. By the end of the first chapter, you'll already be playing your first song. Granted, it's a laughably simplistic single-chord version of "Frère Jacques," but everyone starts somewhere, right? **Winner: eMedia Guitar Method**

Intermediate/advanced instruction: We tested Volume 1 of eMedia's *Guitar Method* series, which covers only the absolute basics—strumming, picking, common chords, and reading music. Additional software packages are available if you're interested in taking your guitar playing to the next level, but you'll have to pay extra for them. In contrast, the PlayPro software covers techniques both facile and sophisticated in one reasonably priced package. **Winner: PlayPro Interactive Guitar**

Multimedia features: While it may not include as many sound clips or instructional videos as PlayPro's software, eMedia's *Guitar Method* does a better job of integrating its multimedia features into the guitar lessons. You'll also find an animated fret board that plays along with the example songs, so you can observe the correct fingering to use. Our main gripe with eMedia's multimedia is that its sound clips and videos don't play unless the *Guitar Method* window is kept in the foreground, making multitasking impossible. Overall, this category comes out roughly even. **Winner: Tie**

Ease-of-use and interface: *Guitar Method* sports an interface that's clean, simple, and easy to use. Important features are readily available, and locating and jumping to a specific lesson is a cinch. However, we occasionally encountered strange bugs and crashes when using the program, such as a cryptic "Handler not specified" error that appeared when we opened one of the lessons. These problems didn't crop up often enough to hinder the learning process, but they were certainly annoying. **Winner: eMedia Guitar Method**





Reference tools: Two clicks of the mouse is all it takes to pull up eMedia *Guitar Method's* chord dictionary, which includes fingering diagrams and audio clips for hundreds of common chords. While eMedia's chord dictionary only shows one of the myriad ways to play each chord, that's probably enough for most beginners. However, PlayPro's thoughtful inclusion of a printed lesson book makes this category a tie. **Winner: Tie**

MAXIMUM PC VERDICT 8

+ GEORGE HARRISON

Intuitive interface and seamless multimedia integration make this the easiest way to learn the guitar.

− AVRIL LAVIGNE

Most of the songs suck, and more advanced instruction costs extra.

$45, www.emediamusic.com

THE UPSHOT

Ultimately, neither PlayPro *Interactive Guitar* nor eMedia *Guitar Method* provide the kind of motivation you'd get from a real guitar instructor—or a cute girl. Both packages will teach you right from wrong and help you master the basics, but neither one makes learning particularly fun—though this is largely due to the dearth of compelling songs included in the lessons.

If you already have the drive to learn the guitar though, eMedia's *Guitar Method* can make the process a lot less frustrating. It doesn't cover as much material or include as many extras as PlayPro's offering, but thanks to its cleaner interface and superior multimedia integration, *Guitar Method* is a better option for beginning guitarists. ■

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SOME FOR THEIR EMPEROR.
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Language
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PC CD-ROM SOFTWARE

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WatchDog

Say hello to Larry, WatchDog of the Month.

Maximum PC takes a bite out of bad gear

THIS MONTH: The WatchDog goes after...

>SoftwareCB.com >AGPTek >Screamworx >His Tail

Stinks Like Fish

DEAR DOG: I think this one belongs in the "too good to be true" category, but I'm unable to find much information about it. While shopping for Adobe *Photoshop* online, I came across a listing for **www.softwarecb.com**. It claims to offer downloads of a variety of programs, mostly from Adobe. The web site says it is legal and references Section 117 of the U.S. Copyright Code (**www4.law.cornell.edu/uscode/17/117.html**). It all seems fishy though, because following the logic of the web site's operators, I could buy a copy of Microsoft *Office* or *Unreal Tournament 2004* and then sell copies of it to my friends.

—EDWARD KLEIN

THE DOG RESPONDS: The Dog was also unable to contact SoftwareCB.com at press time, but did find the web site's premise fascinating. In essence, it seems that SoftwareCB.com hangs its existence on this section of copyright law: "...it is not an infringement for the owner of a copy of a computer program to make or *authorize* the making of another copy or adaptation of that computer program...."

In other words, you're not buying pirated software, you're paying for a service that makes an archival backup for you. Could this possibly be legal?

Hell no, said Bob Kruger from the enforcement division of the Business Software Alliance. Kruger said the anti-piracy group runs into this defense on occasion and he is 100 percent certain it doesn't hold water.

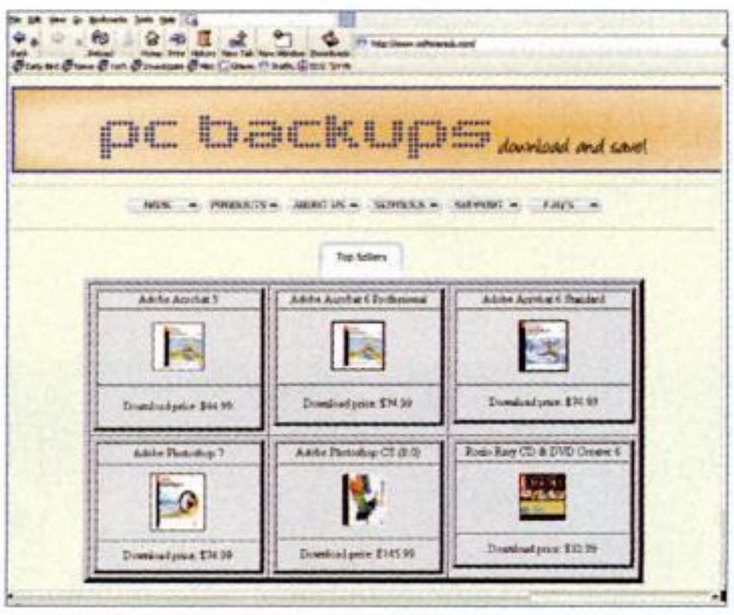
"Section 117 is not designed to enable people to make money selling burned CDs or downloaded CDs," Kruger said. Even if you believe in contorted logic, Kruger said, don't expect the law to. "I don't think any court or jury is going to accept that this is what's going on here."

In most cases, BSA investigators have found that when they make undercover buys and admit to not actually owning the software for which they are buying an "archival backup," the sites still send the software. The obvious question, according to Kruger: "Why would any user who owns an application want to pay anyone for a backup, when they could make a backup themselves?"

Why spend $149 for a "service" to make a backup copy of *Photoshop CS* when you can burn it yourself for 25 cents? The Dog supposes that if you lost your original CD, SoftwareCB.com's "service" could be of some value. Although even that isn't exactly a great deal as most companies will sell replacement CDs for a small fee.

And the big question is, what are you actually getting? A zip file? An ISO? SoftwareCB.com says all sales are final and "by purchasing any product from softwarecb.com, you agree you have knowledge of this product. We do not allow any refunds due to the inability to operate a simple computer function." The web site also states: "Softwarecb.com will not refund any order due to the delayed delivery of a product. Some instances may include e-mail delivery responses, or temporary hosting malfunctions."

So the short answer is what Edward already pointed out in his letter: If it sounds too good to be true, it probably is. Woof.



Could it be legal to download a copy of Adobe *Photoshop CS* for $146?

AGPTek Turkey

DEAR DOG: I'm one of the many unlucky people to purchase an AGPTek videocard that I first saw on the Imagestore web site (**www.imagestore.us**). I bought it through eBay for more money than on the web site! But that's not the problem. The GeForce FX 5600 Ultra was broken when it arrived. Windows 2000 continued to redetect new hardware over and over again. I RMA'd the card through eBay but have yet to receive a refund. From reading AGPTek's web site, it seems that many of its customers are having the same problem. I've been a *Maximum PC* reader for many years and have been reading about everyone else's misfortunes, and hoped it would never happen to me.

The Dog agrees that these are likely the symptoms of a videocard gone bad.

—JOETECK

THE DOG RESPONDS: Like Joe, the Dog also had difficulties contacting AGPTek and Imagestore (both entities appear to be closely affiliated). But after a terse exchange with Imagestore/AGPTek, Joe was finally issued a refund. The company's reason for the delay? No reason. While Joe's happy to get his cash back, the Dog is awfully unimpressed with the service from Imagestore/AGPTek.

Still Screaming?

DEAR DOG: After exhaustive research and fence-sitting, I decided to order a new custom system back in March, shortly before BTX and PCI Express had upgraders chomping at the bit. After evaluating every custom builder I could find, I settled on **www.screamworx.com** for its unique approach to a no-nonsense gaming machine with minimal fan noise. The customer service I received throughout the ordering process was top-notch, and at the end of April the UPS guy unloaded three boxes

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that have brought me nothing but pleasu
and joy. All indications at the time w
had chosen a kick-ass system from e
excellent outfit. That was, un yet
ago, when my e-mails an two
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phone calls, year
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uld be ready to
smoke along

— DAVID MOODY

When the Dog tried to ...orx toll-free number, things didn't look good for David or Screamworx as the number was still "temporarily disconnected." However, when the Dog pinged Sohaib Bhatti, CEO of the company, it was confirmed to be just a telephone problem.

"We are still very much in business" Bhatti said. "We recently had to shift our facilities and our telco provider did not manage our move very well. We will have the lines restored shortly. It's just one of the challenges of this move we are facing, but we hope to resolve all issues shortly. And we continue to provide effective support to our existing customers."

At press-time, however, Screamworx' toll-free number was still offline. While it sounds like Screamworx is still making noise, consumers should exercise caution when purchasing from the company, at least until its phones are fully functioning. Arf.

hat is so stupid it borders on the insane. You buy a piece of software from them. You take it home, it doesn't work. You try to return it, they say "Sorry, you can't return opened software, and we will only exchange unopened software for the same title." Excuse me, how in the world is anyone supposed to know if the program works if they don't open it? And if you didn't open it, why in the name of all that's holy would you be returning it for the exact same title? What, you didn't like the funny smell of the packaging or something? This makes no sense. So what's a person to do? You get some tape and you reseal the packaging. Now, it's unopened.... But here's where it gets even dumber. If it's now been resealed (and they can't tell if it's their seal or mine) how do they know I didn't just put in a blank disk or, hey, a slice of toast, for that matter? They don't know. This is the dumbest concept going in retail today.

So the fault lies with the game manufacturers and nobody else. It isn't the fault of the consumer, and it isn't even the fault of pirates. So stop trying to blame the poor average hard working consumer for the corporate greed of software publishers.

— MICHAEL A. SMITH

THE DOG RESPONDS: Not all the responses were so adamant. Some readers offered useful tips on getting games to work. Reader Wyatt Gruver said his EA Games titles stopped working after he switched from a VIA KT400A-based motherboard to an nVidia-based nForce2 400 Ultra board. EA reps and the usual sources could offer no solution. Gruver said the latest version of nVidia's IDE drivers corrects the problem.

Reader Kevin Gay had a problem with *Battlefield: Vietnam,* which uses Safedisc instead of SecuROM. "I tried everything that the support page says to do. Finally I did the exact opposite of what was "supposed" to work. I got an ISO creator at www.magiciso.com, created an ISO of my original *BF:V* disc. Reinstalled *Daemon Tools,* turned on every bit of emulation it had, loaded the ISO and played my game. So in the end I used the very thing they didn't want to be used to play their game." ■

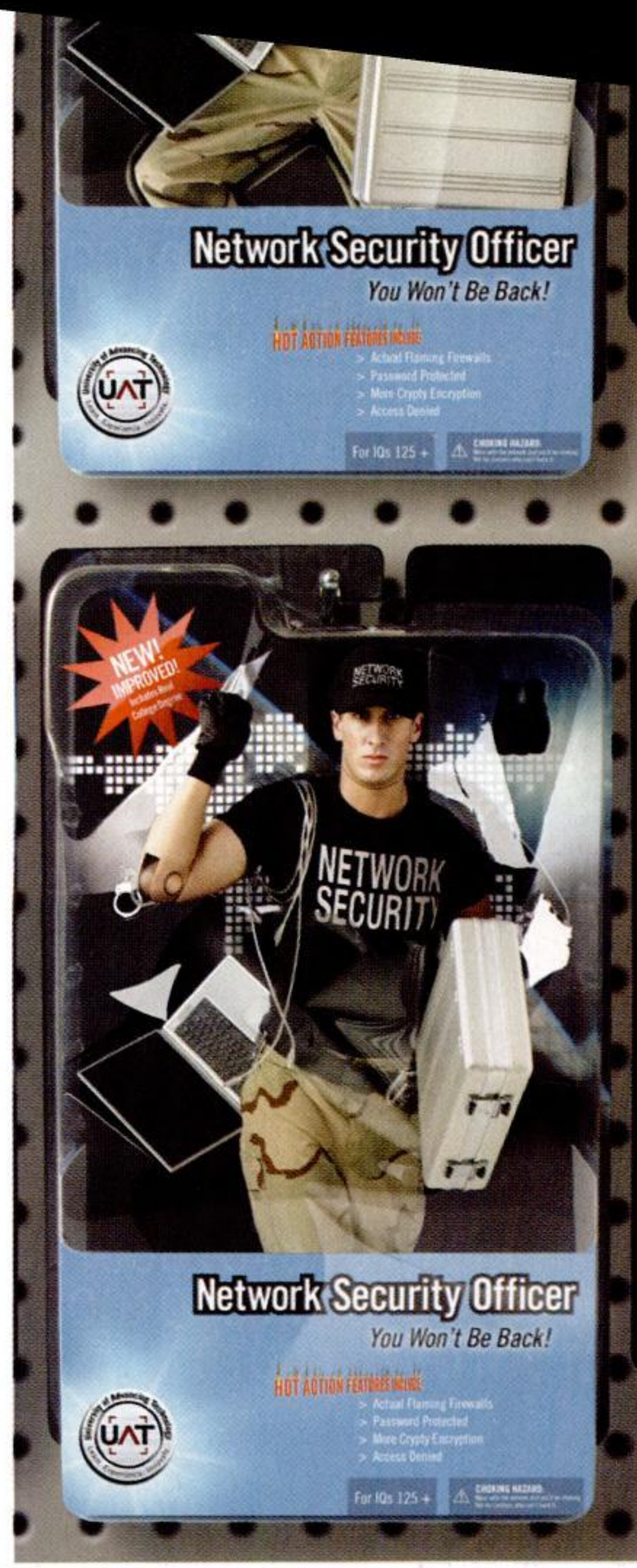
> ***"SORRY, IT ISN'T FAIR TO MAKE CONSUMERS PAY FOR A BETA COPY OF A PROGRAM OR FORCE THEM TO DOWNLOAD PATCH AFTER PATCH."***

Blaming the Wrong Party

DEAR DOG: The Dog needs a whack on the nose for suggesting in the July issue that some of the blame lies on pirates and not just game publishers for making games that won't work with virtual drive programs. The problem is solely with greedy game publishers rushing to get games that are not ready out the door and on the shelves. The result is that the game is far from finished when it's put on the shelves and we the consumers are left doing the job of beta testers. Sorry, but it isn't fair to make the consumers pay for a beta copy of a program or force them to download patch after patch.

My final bitch is about trying to return these defective games. Most stores (most notably Best Buy) have no return policy for software, or I should say, have a return policy

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.



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MENU

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BMW iPod Adapter

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1-800-334-4BMW

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POST MODE

This fantastic Dream Machine paint job was provided by Smooth Creations.

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RIN PC

Custom built and carefully crafted, Dream Machine 2004 is more than just fast—it's future-proof

How advanced is Dream Machine 2004? Let's put it this way: Next-generation parts were our starting point as we planned our ninth annual foray into PC extravagance.

As we began to contemplate this year's project, code-named "Afterlife," we found ourselves preternaturally fixated on hand-crafting a system, nay, an experience that in addition to being fast, would be as forward-thinking and future-proof as possible. Like it or not, the PC is in the middle of a massive upgrade cycle that transcends the usual upward mobility of videocards and hard drives. And woe to the PC builder who fails to embrace the onset of significant new technologies like PCI Express and DDR2.

Hence the postmodern theme, represented by a decidedly postmodern paint job and a futuristic, fully functional, front-mounted LCD screen. But we have to confess: After we identified the components and technology we wanted to use, we began to sweat nervous bullets. The Maximum PC Lab has witnessed a parade of record-shattering prebuilt PCs. Would our hand-crafted future rig meet the performance challenge?

When we finally got it running, we breathed a sigh of relief. Of course it did. Of course it did. Our custom-built PC smashes the competition with a scintillating combination of speed, versatility, and looks that—it must be said—is like a dream come true.

Without any further adieu, we proudly present Dream Machine 2004.

IT COSTS HOW MUCH?

We thought last year's Dream Machine, which registered a cool $11,000, was extravagant, but as we tallied up the prices for this year's rig, we were pleased as punch to discover that we surpassed that total by more than a grand. Is it practical? No. But when you fantasize about the home of your dreams, do you conjure up the two bedroom, $250,000 pad or the ostentatious 17-bedroom, $27.7 million pimped-out crib? Our point exactly.

So what does more than $12,000 get you? A whole lot of computer. Read on to find out. And prepare to drool puddles.

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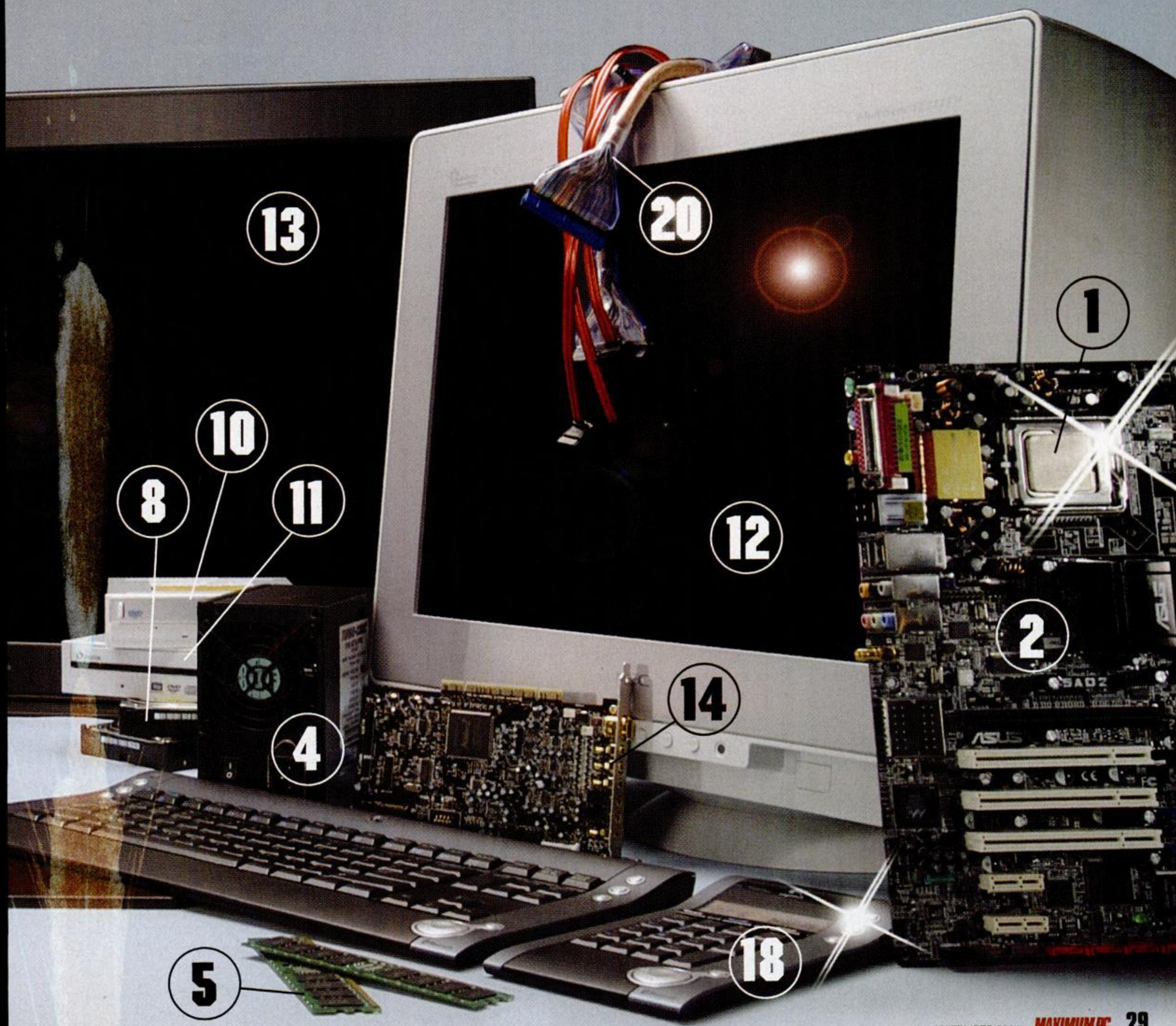
PARTS

1. CPU: Intel Pentium 4 560 ..... **$700**
2. Motherboard: ASUS P5AD2 Premium **$300**
3. Case: Silverstone Nimiz SST-TJ03* **$1,070**
4. Power supply: PC Power and Cooling Turbo Cool 510 Deluxe Express **$219**
5. RAM: Crucial Technology Two sticks 1GB PC-4200U DDR2/533 ..... **$730**
6. Primary videocard: ATI Radeon X800 XT Platinum Edition **$500**
7. Secondary videocard: ATI All-in-Wonder VE **$99**
8. Primary storage: Two Western Digital 740GD Raptors **$500**
9. Secondary storage: Two Maxtor DiamondMax 10s **$500**
10. Dual-layer optical drive: Sony DRU-700A **$200**
11. Optical drive: Plextor PX-712A **$200**
12. CRT display: NEC MultiSync FE2111 SB **$600**
13. LCD display: Sharp LC-M3700 ..... **$5,000**
14. Soundcard: Creative Labs Sound Blaster Audigy 2 ZS Gamer **$100**
15. Speakers: Logitech Z-680 ..... **$300**
16. LCD touch screen: Earth LCD XLK-5002T **$795**
17. Cooling: Thermaltake Jungle512 fan/heatsink combo **$30**
18. Mouse and keyboard: Logitech DiNovo Media Desktop **$250**
19. Mouse pad: C4 Mouse Pad **$10**
20. Cables **$25**
21. OS: Windows XP Pro **$200**

Total $12,328

*This price includes $800 for the custom paint job

Note: The prices found on this page represent the common retail prices found online during DM2004's creation. When street prices weren't available, we went with MSRPs.



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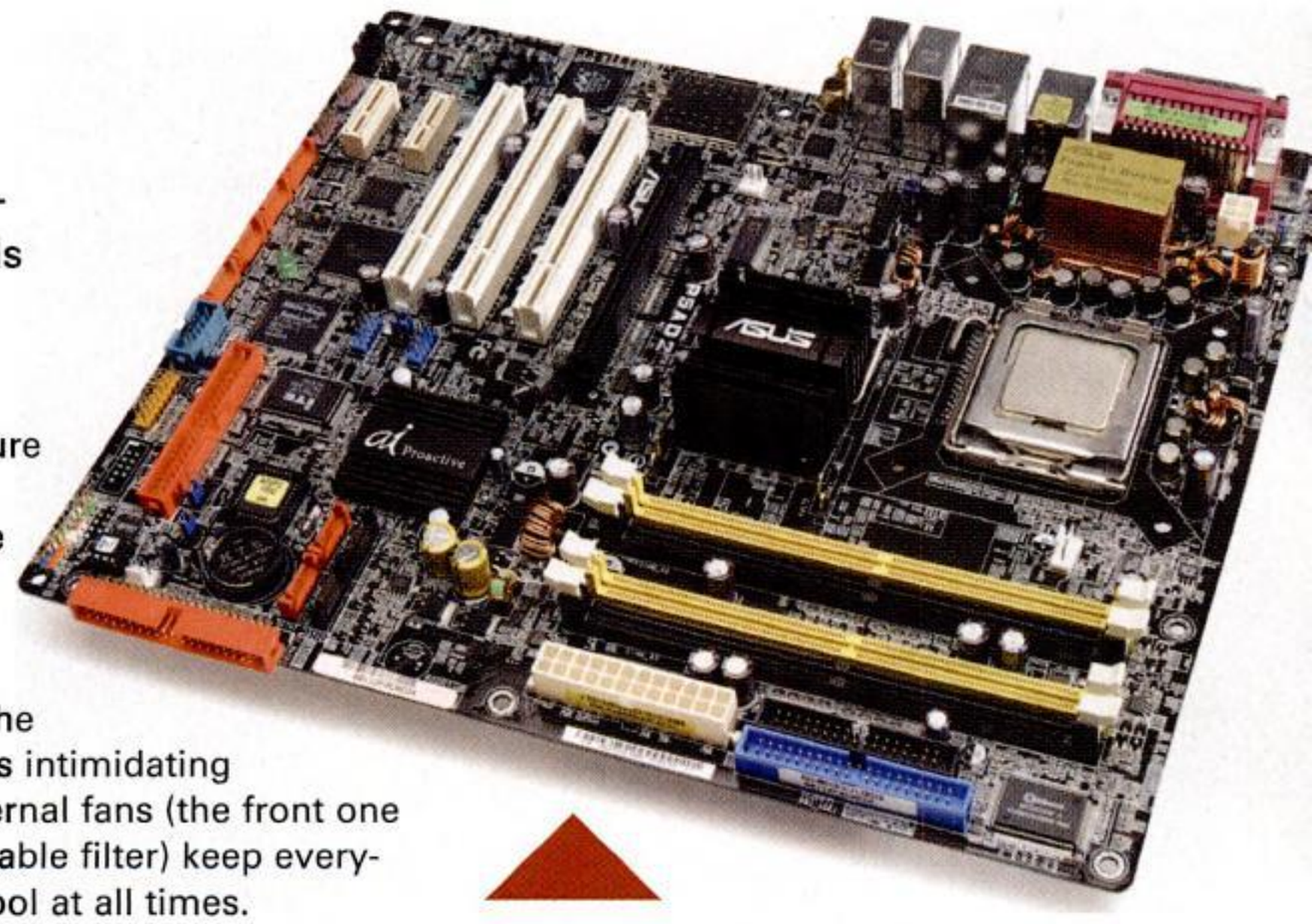
THE PARTS

What makes Dream Machine 2004 so dreamy? Its components, of course. Read on for explicit technical details on the parts we chose—and why we chose them



CASE: SILVERSTONE NIMIZ SST-TJ03

Back in the old days, we always used PC Power and Cooling cases made from solid steel for the Dream Machine. These enclosures were extremely stout, and sturdy enough to withstand a top-secret crucible known internally as the "staffer squat." We used this highly scientific procedure to determine how a case would hold up to, say, the sitting weight of a middle-aged mammal. This year we inadvertently added another "real world" test known as the "intern drop" to our Dream Machine case selection, and we're happy to report that the case we chose—Silverstone's magnificent Nimiz—passed both tests with flying colors. The Nimiz is able to hold all of the Dream Machine's payload without being cramped or causing a thermal crisis. And building the machine resulted in nary a nicked thumb or muttered obscenity. Even though we used a total of six bays *and* included an LCD display, there's still plenty of room for working on the internals and future expansion.

We also adore its all-aluminum construction, which allows it to achieve a lithe feel that belies its intimidating stature. Four internal fans (the front one even has a washable filter) keep everything nice and cool at all times.

For this year's Dream Machine case, we wanted a paint job in sync with our PC's forward-thinking, future-proof nature. Words like abstract, sleek, and post-modern dominated our thoughts. With this—and Art Director Natalie Jeday's early drafts in mind—we enlisted the aid of the custom-painting PC wizards at Smooth Creations.

Founded by Jim Saling in 1999 as a continuation of his career in high-end automotive painting and detailing, this company performs amazing work, and uses the exact same meticulous process to paint PCs as they do with Lamborghinis and Dodge Vipers. The process begins with a complete disassembly and acidic wash of the case. That's followed by a dip in an anti-corrosion etching solution that ensures the paint will stick. Then multiple coats of custom-mixed, high-quality automotive paints are applied, followed by multiple coats of a clear polymer. Finally, all the components are baked in a thermal downdraft oven, and the case is wet-sanded, buffed, and polished.

The result: a sleek, classy, elegant work of art that's fit to house and protect our Dream Machine.

www.silverstonetek.com,
www.smooth-creations.com

MOTHERBOARD: ASUS P5AD2 PREMIUM

We've expressed love for Asus motherboards' performance and reliability, but have criticized them for their conservative feature sets. This is definitely not the case with the company's new P5AD2 Premium, which is easily the most over-the-top mobo package we've ever seen. And we don't mean color-coded IDE cables or breakout boxes you'll never use. We're talking about a tour de force of useful, forward-thinking features.

Three onboard RAID subsystems using the new Intel ICH6R, Silicon Image, and an ITE controller, respectively, grant us a total of eight Serial ATA ports and three parallel ports. Although the Silicon Image controller lets you run up to four drives in RAID, our Lab tests revealed that Intel's new ICH6R coupled with two 10K Raptor drives actually outperformed four 10K Raptors on the Silicon Image controller. Why the performance gap? The SI controller suffers in comparison because it's bridged to the PCI bus, which limits it to 133MB/s. The ICH6R's ports on the other hand, are located directly in the south bridge and take advantage of the new Direct Media Interface that moves data between the south and north bridge at speeds up to 1GB/s in each direction.

Asus is also the first company we've seen to include not just FireWire A but also FireWire B—aka IEEE-1394B. This doubles the effective data transfer rate from 400Mb/s to 800Mb/s. On the USB 2.0 front, there are a total of eight ports available on the back panel and internal headers. Asus also goes over the top on the networking front with not just one but two Gigabit Ethernet ports *plus* an onboard Wi-Fi 802.11b/g controller.

Audio is compliant with Intel's new HD Audio spec and uses a C-Media 24-bit codec. But wait, there's more! Asus also bundles an adapter that lets you plug two SATA drives into the *outside* of your PC—and a heat spreader to help dissipate heat through the bottom of the motherboard. That's not even mentioning the

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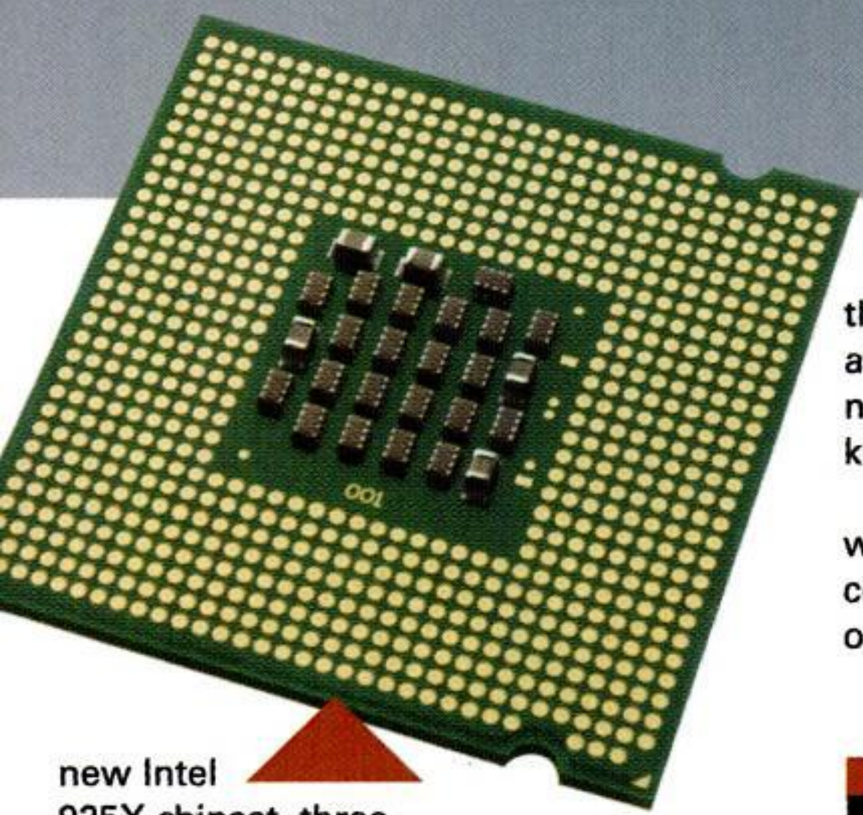


new Intel 925X chipset, three PCI Express slots, dual-channel DDR2 support up to DDR2/600 speeds, and overclocking features that make it such a badass mobo we think it should have its own soundtrack.
www.asus.com

CPU: INTEL 3.6GHZ PENTIUM 4 560

Selecting this year's CPU was likely the most difficult decision in the history of the Dream Machine process. We had three potential chips in mind: Intel's Pentium 4 560 (that's a 3.6GHz Prescott in the real world), the 3.4GHz Pentium 4 Extreme Edition, and AMD's stellar Athlon 64 FX-53 in Socket 939.

Each CPU has its strengths and weaknesses. The Athlon 64 FX-53 is generally acknowledged to be faster in games while the Extreme Edition is better in most applications. Both Intel chips are faster in multitasking—when you run at least two CPU-intensive apps at the same time—thanks to Hyper-Threading.

The Intel side of the coin, however, had a decided advantage given our desire to build a next-gen PC: PCI Express and DDR2 goodness. We tried mightily, but we just couldn't acquire an AMD-based motherboard that supported PCI Express. And because the memory controller is integrated into these CPU cores, it would have taken the fabrication of a brand-new core to support DDR2 RAM. After AMD declined to crank up its fab in order to crank out a single chip for us, the decision became clear.

With our choice narrowed to two chips, we thought it would have been easy for the Pentium 4 Extreme Edition to supplant the Pentium 4 560. After all, we recommended that people *not* buy the Prescott a few months ago in Socket 478 trim when it ran at 3.2GHz. Surprisingly, however, the P4 560 turned in some decent numbers that made it extremely competitive with the Extreme Edition CPU. Was it the new chipset? Or maybe a secret spin of the core by Intel that corrected the sub-par performance at 3.2GHz? Or maybe the Prescott simply needs higher velocity clock speeds to keep its 30-stage pipeline well fed?

Ultimately, what mattered most was the chip's overclocking ability. We couldn't squeeze many extra clock cycles out of our Extreme Edition, but we were able to push the 3.6GHz P4 to a stable 3.97GHz with simple air-cooling. We won't call it 4.0GHz, but we think it's fair to call it 4GHz. At this speed, the machine ran through no less than 10 iterations of *SYSmark2004* plus a battery of other benchmarks without a single hiccup.
www.intel.com

INSIDE THE DREAM MACHINE: PCI EXPRESS

A brand-new bus architecture results in an astronomic increase in data transfer rates

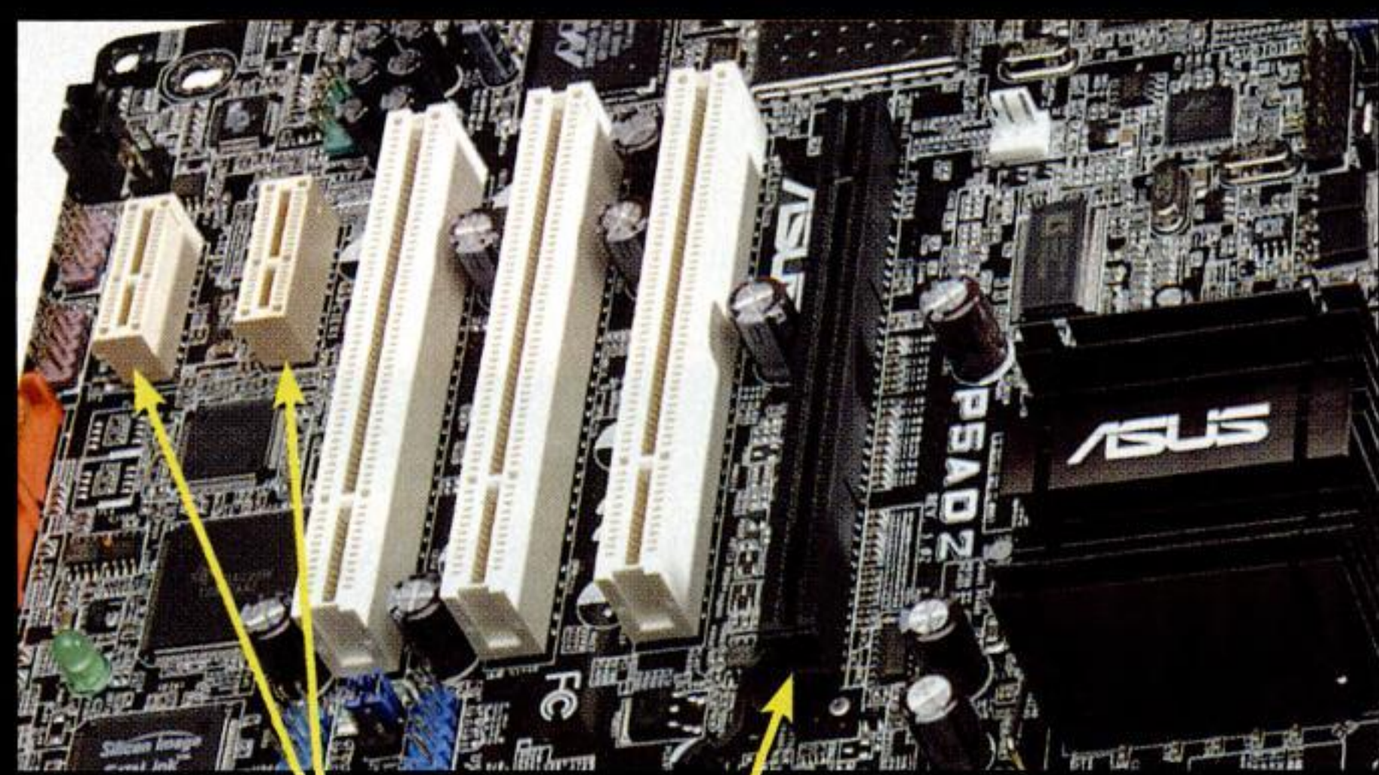
PCI Express isn't just a fancy new name stamped onto old technology. PCI Express ushers in a new era for computing that's a quantum leap over the 12-year-old parallel PCI (peripheral component interconnect) bus. That's right—12 years!

The average desktop's PCI slots top out at 133MB/s. While extended flavors of PCI can hit higher speeds, the technology is rapidly approaching its limits because you can only push data in a parallel interface so far before you encounter problems.

Think of the data as a car on the freeway. The freeway itself is the PCI bus. Now, put five cars abreast and have them drive down a twisting, turning freeway, staying within two feet of each other at all times. At 50mph, it's easy. Now get the cars to try to maintain the two-foot distance at 150mph. The higher speed makes it harder for the cars—our stand-in for data—to maintain their synchronicity.

This is the problem with parallel busses on the PC. On the PCI Express freeway, just one car is moving down the freeway, which is one lane wide. Since this car can drive down the freeway without the need to maintain close contact with four other cars, it can easily drive at 100mph, 200mph, or 300mph. One of the advantages of PCI Express, however, is that it also allows you to run multiple lanes. But, because each lane operates independently of the others, they don't have the same limitations as the parallel PCI bus.

Each PCI Express lane can support data transfer rates of 200MB/s. Early motherboards will support a single x16 slot (pronounced "by sixteen") for graphics cards and between two and three x1 slots for expansion cards. As PCI Express cards are introduced, we expect PCI to largely become a legacy slot—much like ISA, which it replaced.



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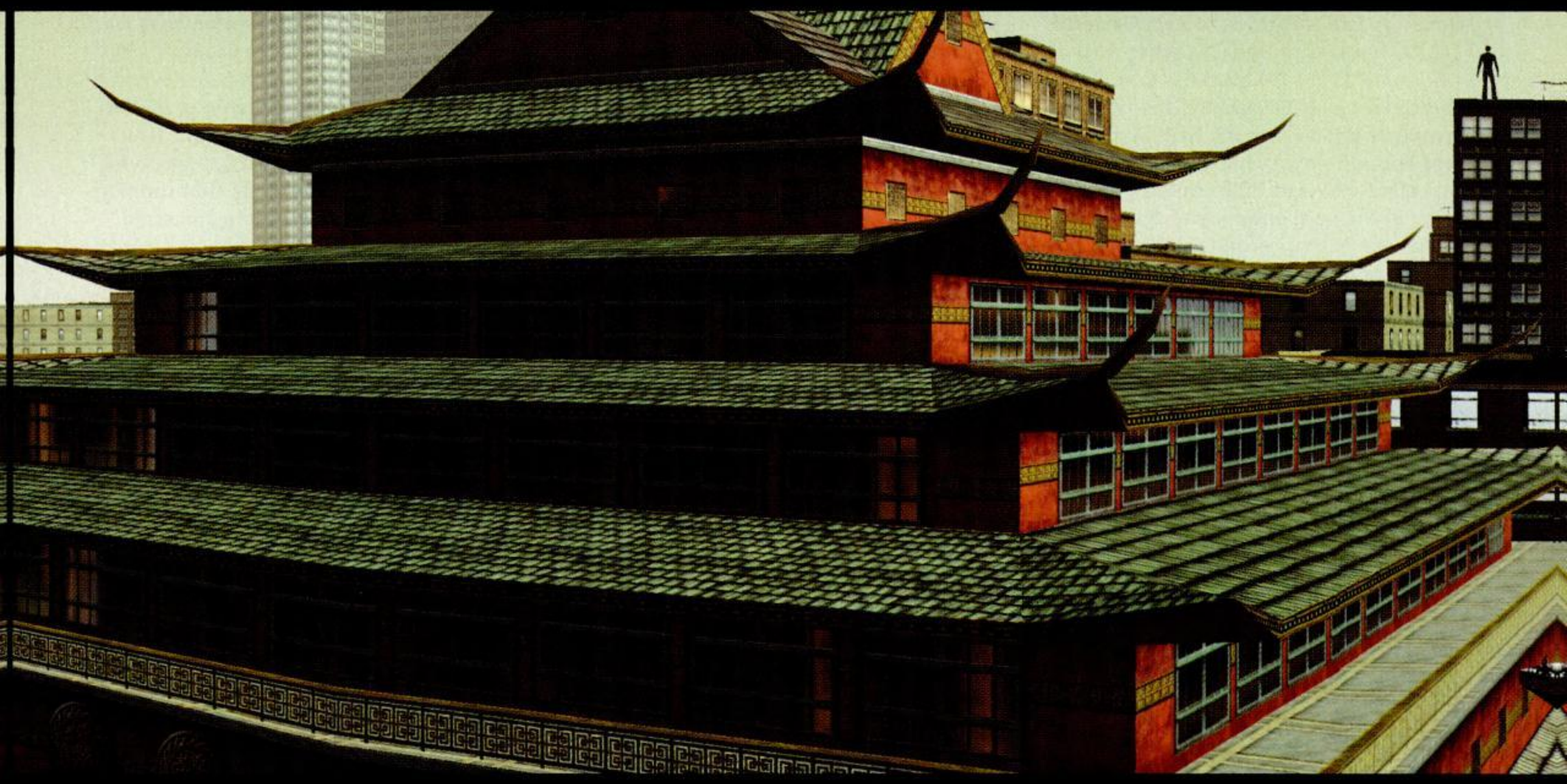

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PSU: PC POWER AND COOLING TURBO COOL 510 DELUXE EXPRESS

We lecture so often on the virtues of using a high-quality power supply that we sometimes feel like a schoolteacher—or a parent lecturing a child. We were reminded why we constantly harp on the topic while configuring this year's Dream Machine.

During our initial Dream Machine forays, we got the machine up and running with a Pentium 4 Extreme Edition processor, a next-gen PCI Express videocard, 1GB of RAM, and two Western Digital Raptors drives. But when we upgraded to the Prescott Pentium 4 and the GeForce FX 6800 Ultra, the machine wouldn't boot. What the hell happened? Not enough power, baby—our original so-called 460-watt PSU couldn't hack it, even in the cool environs of the Lab. So we asked PC Power and Cooling to send us one of its Turbo Cool 510 units with the new 24-bit main power connector and a six-pin videocard power connector.

We're convinced that two factors let us get within the range of 4GHz: the CPU's beefier Thermaltake heatsink and the reliable power from the Turbo Cool 510 Deluxe. You're taking notes, right?

www.pcpowerandcooling.com

VIDEOCARDS: RADEON X800 XT PLATINUM EDITION AND ALL-IN-WONDER VE

Choosing the perfect videocard for the Dream Machine is never easy. This year, it was especially and excruciatingly difficult. After much soul searching, endless rounds of benchmarking, the discovery of a few ugly driver bugs, and about 200 cups of coffee, we all came to agreement on a one-two punch of videocard glory—the PCI Express Radeon X800 XT Platinum Edition and the PCI All-in-Wonder VE.

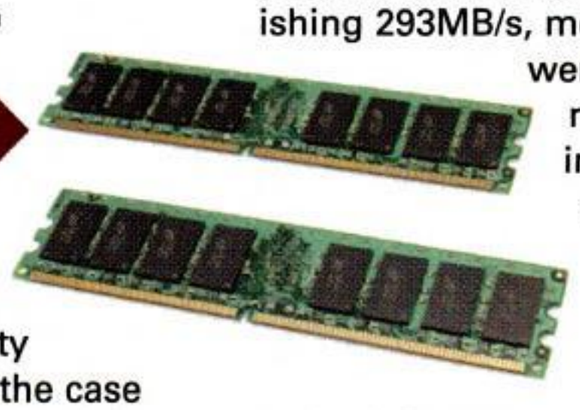
The PCI Express version of the X800 XT Platinum Edition represents the future of videocard technology, but its PCI Express chops are not what earned it Dream Machine status. Oh, no! Instead, the deal was clinched with the X800's kick-ass performance in pixel and vertex shader games and its svelte one-slot formfactor—this year's Dream Machine is short on PCI slots, so it was crucial we use just a single slot for our videocard.

Dig these numbers: 81.7 frames per second in *Halo*. 13,410 3D Marks. We've seen very few videocards come close, and we were able to achieve these scores without any major overclocking—we nudged the GPU core up to 546MHz and the 256MB of GDDR3 memory up to 565MHz (from 520MHz core/560MHz memory).

The other half of our dynamic duo, and the driving force behind our front-mounted LCD touch screen, is ATI's old-school All-in-Wonder VE—the only PCI videocard (from ATI) we could find in today's fast-paced world of AGP and PCI Express. The TV tuner in the card is a bonus but it was not a primary factor in our decision. Also, we've found that when using more than one videocard in a system, it works best if they both use the same driver. ATI and nVidia cards generally don't play well together.

www.ati.com

MEMORY: CRUCIAL 1GB PC-4200U DDR2/533



What happens when Intel pushes a new memory standard and invests $450 million in a RAM manufacturer? Mighty fast RAM, that's what. Such is the case with the Micron/Intel relationship, which was designed to spur production of DDR2 memory chips. And because Crucial Technology is the direct seller of Micron RAM, you can't get any closer to the source. For this year's Dream Machine, we selected a pair of the company's 1GB DDR2-533 DIMMs because of their speed and because they overclock like crazy. Using the pair of 1GB DIMMS also keeps two memory slots free for additional RAM—because you never know when you may need to move up to the 2GB mark.

www.crucial.com

PRIMARY STORAGE: 74GB WESTERN DIGITAL 740GD RAPTOR

Jurassic Park taught us that the Velociraptor was a pack hunter, so it makes sense that Western Digital's 10K Raptor drives work best in pairs. When attached to the Dream Machine's ICH6R south bridge with Intel's onboard RAID controller running in RAID 0, these two speed demons were so fast that running benchmarks on them was like feeding wood into a chipper.

In *HD Tach 2.61,* the Raptor tag-team delivered a shocking average sequential transfer rate of 112MB per second. Transfer rates topped out at a mind-bending 140MB/s on the Raptors' outer platters, and burst speeds reached an astonishing 293MB/s, meaning the Raptors were *this* close (as you read this, hold your index finger and thumb a few millimeters apart) from completely saturating the SATA 150 bus—an impressive feat indeed. Seek times hovered at around 8ms, which stomps all over the standard 12ms average seek time recorded by 7,200rpm drives and makes the system "feel" incredibly fast too.

If you think a two-drive Raptor array looks familiar, you're right. We used one in last year's Dream Machine too. Truth be told, we wanted to do something different this year, but even though it's almost two years old now, the Raptor still rules the roost, as no other manufacturer has ven-

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tured into the 10,000rpm SATA market. We also considered a four-drive array, but the onboard Intel RAID controller allows only two drives in RAID, so that was the end of that. Still, the two-drive array simply cannot be beat in terms of sheer performance, so here we are once again.
www.wdc.com

SECONDARY STORAGE: 300GB MAXTOR DIAMONDMAX 10

Maxtor's all-new DiamondMax 10 hard drive came within a hair of being chosen as the primary storage for this year's Dream Machine. Compared with the 74GB Raptor, the 300GB DiamondMax is just a tick slower while offering *four times more storage capacity*—a compelling combination indeed. Under normal circumstances we'd have no problem sacrificing a bit of speed for an extra 450GB of storage, but these aren't normal circumstances—this is the Dream Machine we're talking about.

And when it comes down to it, although the 7,200rpm DiamondMax drives are the fastest in their class, they are still a tick slower than the Raptors.

So, how much is "a tick," you ask? During Lab testing, the DiamondMax drives trailed the Raptors by a margin of approximately 10 percent, which is stunning considering the Maxtors spin at a mere 7,200rpm compared with the Raptors' 10,000rpm rotational velocity. In terms of benchmark numbers, the Raptor's average read speed is approximately 61MB/s, while the DiamondMax drives are able to achieve an impressive 55MB/s average sequential transfer rate, making it the fastest 7,200rpm drive we've tested. Even though the Raptors hold a rotational speed advantage, the Maxtor drives almost overcome this deficiency by using twice as much cache—16MB per drive compared with the Raptors' 8MB.

Is it audacious to use the fastest 7,200rpm drives in captivity as mere backup drives? Perhaps. But, once again, this is the Dream Machine—the fact that our system's secondary storage is faster than most people's primary drives just reinforces the Dream Machine's mantra—that you are not worthy.
www.maxtor.com

DUAL-LAYER OPTICAL DRIVE: SONY DRU-700A

The timing is so perfect we almost suspect otherworldly guidance. Jack "VCRs will destroy Hollywood" Valenti steps down as the head of the Motion Picture Association of America, and dual-layer DVD burners step into our PCs. It's now possible to make perfect 1:1 copies of even commercial DVDs without resorting to multiple discs, stripped features, or recompression. We've been waiting for this a long time, and Sony not only did it first, but did it *right*. A full 8.5GB DVD-Video can be copied in less than an hour. Even better, the resulting disc has extraordinary compatibility with set-top players and DVD-ROMs.
www.sony.com

OPTICAL DRIVE: PLEXTOR PX-712A

With 8x burning to DVD+R and DVD-R as well as 40x CD-R burning, we were tempted to adopt the DRU-700A as our Dream Machine's sole optical drive. But we couldn't resist combining it with Plextor's PX-712A. This way we can perform unattended disc-to-disc copying. Adding the PX-712A also allows us to burn at 12x to single layer DVD+R (even with some 8x DVD+R media) for finishing jobs quickly. This also gives us the benefit of Plextor's hardware features (like a generous 8MB buffer) and its massive software toolbox. Want to create an encrypted disc so your parents can't

INSIDE THE DREAM MACHINE: HOW DO YOU COOL A RIG THIS FAST?

It wasn't as hard as you might think...

We explored several different options for cooling the overclocked P4 Prescott processor that powers this year's Dream Machine. We initially considered using a phase-change setup, but an LGA775 compatible kit was not yet available at the time of the Dream Machine's construction. We also didn't like the fact that we would have been locked into using a specially designed case had we gone the phase-change route.

We next considered a water-cooling solution, but we were again stymied by the lack of compatible hardware: None of the vendors we contacted had a Socket T-compatible water block available. This left us with only one practical solution: air-cooling. It's difficult to properly cool an overclocked rig using traditional air-cooling methods, but thankfully, we were able to secure a high-performance heatsink/fan combo that was up to the task of keeping the Prescott from overheating: the Thermaltake Jungle512.

The Jungle512's speedy fan and large heatsink proved to be a significant upgrade to the stock Intel cooler and made for an effective cooling solution when paired with Arctic Silver's fantastic Series 5 thermal paste: This powerful combination played an integral role in getting the Dream Machine running at a blistering yet stable 4GHz. We also appreciated the Jungle512's push-pin connectors, which all but eliminate the potential for damage to the motherboard from an errant screwdriver during installation.

The Jungle512's best feature, though, is the fact that it can be easily removed and replaced should a better cooling option become available in the near future, an important consideration given this year's future-proof theme.
www.thermaltake.com, www.arcticsilver.com

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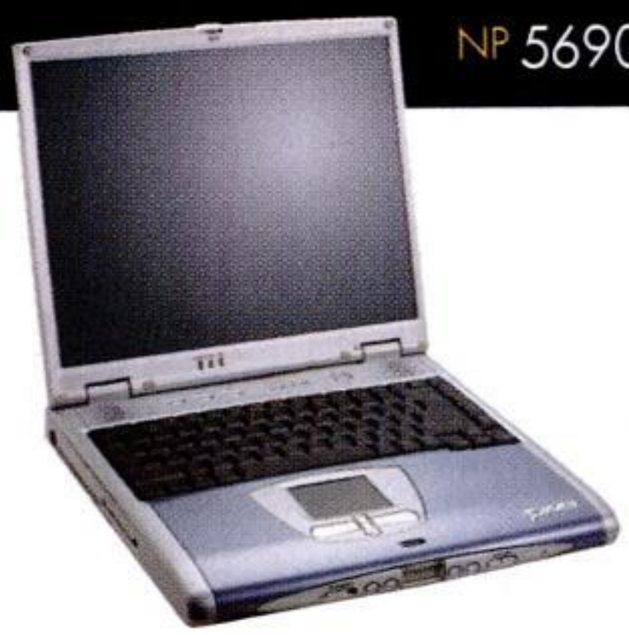

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www.plextor.com

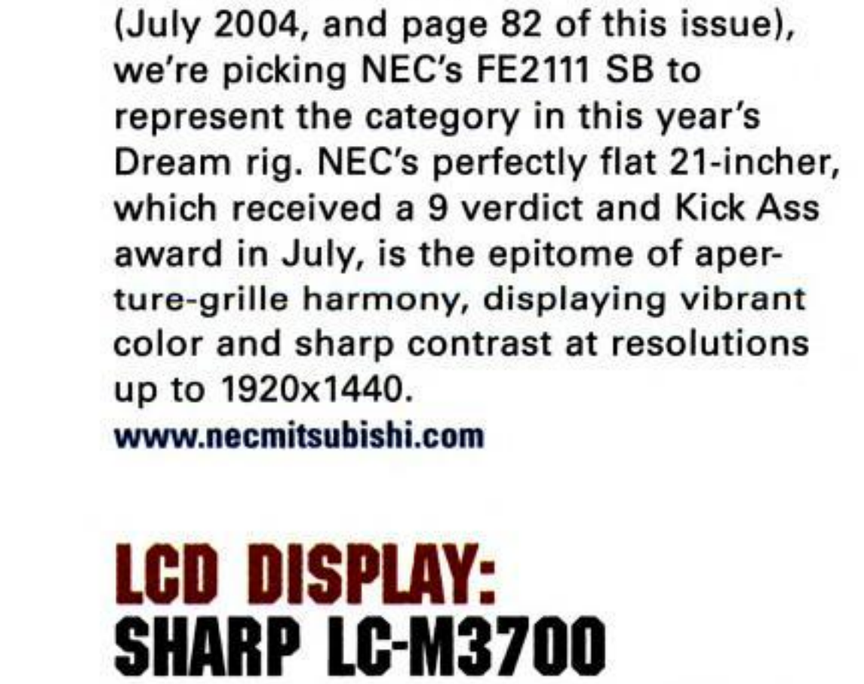
CRT DISPLAY: NEC MULTISYNC FE2111 SB

Though we're thinking in terms of the future, we don't know of any display technology that's as good for PC gaming as a traditional, tried-and-true, aperture-grille CRT monitor. Resolution flexibility alone makes it the only sensible choice, to say nothing of a CRT's superior handling of fast-moving content. Having recently reviewed a number of leading-brand CRT monitors (July 2004, and page 82 of this issue), we're picking NEC's FE2111 SB to represent the category in this year's Dream rig. NEC's perfectly flat 21-incher, which received a 9 verdict and Kick Ass award in July, is the epitome of aperture-grille harmony, displaying vibrant color and sharp contrast at resolutions up to 1920x1440.
www.necmitsubishi.com

LCD DISPLAY: SHARP LC-M3700

Our display options don't end with the CRT pictured above, however. After all, what makes a Dream Machine if not a healthy dose of decadence? Hence, the inclusion of Sharp's LC-M3700 LCD monitor. When we're good and tired from an intense session of first-person murder and mayhem, we like nothing more than to kick back on a comfortable sofa for some quality web surfing or DVD viewing (or even the two in tandem), and Sharp's 37-inch TFT Active Matrix liquid-crystal behemoth is our kind of enabler. With a maximum resolution of 1366x768 it more than meets the demands of commercial DVD content, which looks nothing short of spectacular spanning the LCD's evenly lit, richly colored, wide-angled expanse. And it's no slouch when it comes to High-Definition content, either. Plus the M3700's got input options aplenty: DVI, Analog, S-video, Component, RCA Composite—it's all there, tucked discreetly behind the monitor's rear terminal cover.

As big as this bad boy is, its svelte profile and wall-mountable option keep it from being physically intrusive, and its 170-degree all-around viewing angle makes for superb off-axis image quality. It costs a pretty penny right now, but given the rate at which LCD technology is advancing, we wouldn't be surprised if every PC setup of the future includes such lovely abundance.
www.sharp.com



SOUNDCARD: CREATIVE LABS SOUND BLASTER AUDIGY 2 ZS GAMER

Believe it or not, we seriously considered running the advanced HD Audio built into the Asus P5AD2 Premium mobo as our Dream Machine's sole source of audio. And why not? The motherboard has a built-in 24-bit C-Media codec that supports up to eight channels of audio. In the end though, we decided that audio quality was more valuable than bells, whistles, and the novelty of newness.

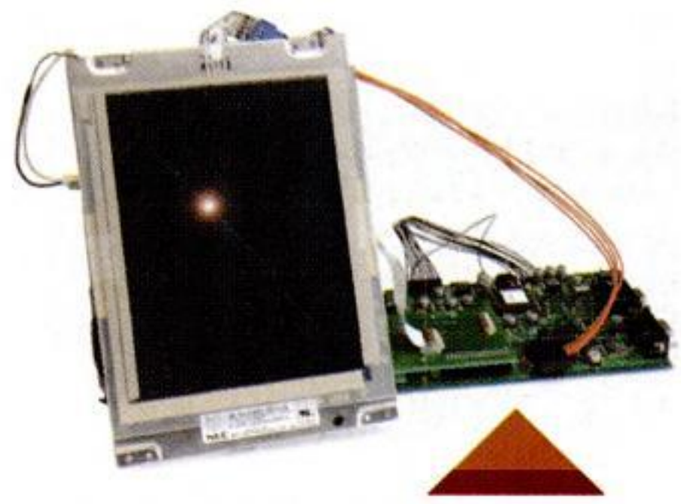
With a set of Sennheiser headphones, we closely listened to 24-bit/96KHz-source material on the P5AD2 Premium and decided that while it sounded very good, it still couldn't beat a discrete soundcard. So we reached for a trusty Sound Blaster Audigy 2 ZS gamer card. With its 108dB SNR and hardware DSP, it's a pretty clear call. Throw in the only hardware support for EAX 3 and EAX 4, and we can say the sun hasn't set on discrete audio—not yet, at least.
www.creativelabs.com

SPEAKERS: LOGITECH Z-680

Just as the Dream Machine strikes fear into the hearts of benchmarks everywhere, the sound of Logitech's earth-shaking Z-680 5.1 speakers never fails to send small animals and Mac users scurrying for cover. Every time we crank up these speakers in the Lab, we hear muffled cries of "run away!" coming from the *Mac Addict* side of the building, which gives us yet another reason to love this utterly incredible speaker set.

Although they've been around for two years now, the Z-680s still rock harder than any other speaker system we've tested, and are *still* the only 5.1 speakers that offer both analog and digital input. This means we get discrete five-channel sound in movies and superb five-channel DirectX sound in games too.

They're the closest we've seen to a set of perfect speakers, so it's only natural that the Z-680s are paired with the closest thing to a perfect PC.
www.logitech.com



TOUCH SCREEN: EARTH LCD XLK-5002T

The Dream Machine isn't simply about over-the-top performance. It's also about extraordinary, forward-thinking functionality. This year, we wanted to add a front-mounted touch screen LCD, but we couldn't find any preconfigured kits, so we rolled our own.

We found a 640x480, 6.5-inch TFT LCD

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M
CONTENT RATED BY ESRB
Blood and Gore
Intense Violence

Distributed By
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Developed By
id™
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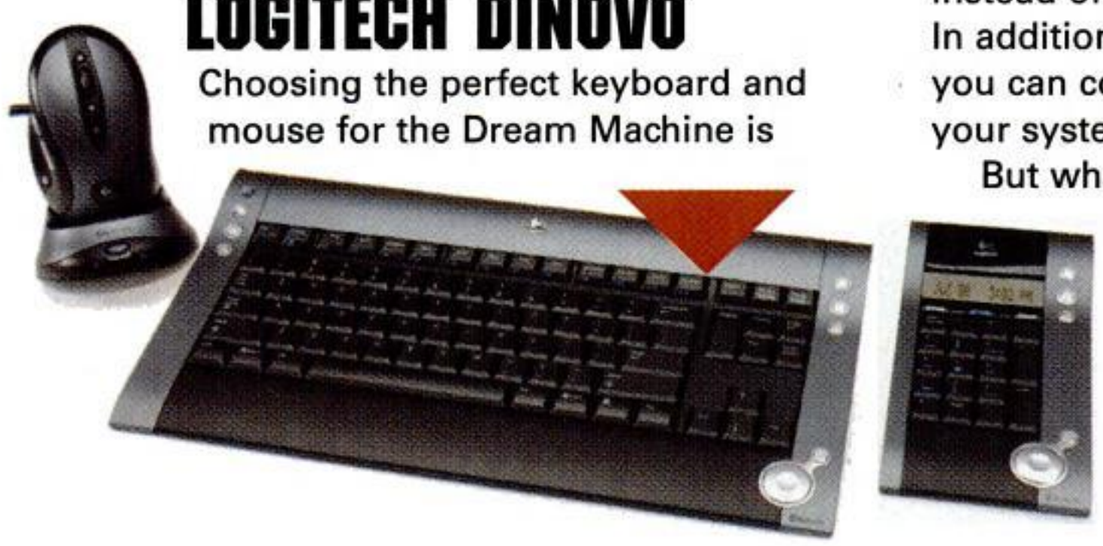
display, a resistive touch screen, and a PCI videocard that work together to display, well, pretty much anything we want. We've used it for everything from the Windows login screen to displaying movies while we toil on our PC. We were even able to gin up a basic application we can use to activate our favorite apps.

We got the LCD, the touch screen, and all the software and hardware necessary for operation with a standard videocard from EarthLCD.com for about $800. (An ATI All-in-Wonder PCI videocard runs this third display.)

www.earthlcd.com

MOUSE AND KEYBOARD: LOGITECH DINOVO

Choosing the perfect keyboard and mouse for the Dream Machine is always a challenge. Finding a keyboard and mouse that respond fast enough for gaming sessions, feel comfortable enough to use for extended periods of time, and include all the features we demand gets more difficult every year.



The Logitech DiNovo Media Desktop combines beautiful form with flawless functionality. The three-piece set contains a mouse that's fast enough for even a hardcore gamer, a slim QWERTY keyboard, and a small numpad. Both the keyboard and the numpad sport handy media controls, which can play, pause, and change tracks.

We really dig the DiNovo's wireless connectivity, especially because it connects your hardware using Bluetooth instead of a basic proprietary radio link. In addition to the keyboard and mouse, you can connect any Bluetooth device to your system using the built-in hub.

But what we dig the most is the separate media numpad. It can be used as a standard numeric keypad, as a calculator, or as a media controller—which works flawlessly with the rudimentary 10-foot user interface it ships with the DiNovo. The LCD screen on the numpad also displays relevant information, either the date and time or the track and artist info for the currently playing song.

www.logitech.com

MOUSE PAD: C4 NGEN MOUSE PAD

Most people are happy to use whatever piece of foam and rubber happens to be lying around, but not us: We wouldn't dream of resting our mouse on anything but CS Hyde's C4 NGen mousing surface.

The NGen's ultra-slick surface is made of a Teflon coating that will have your mouse gliding across your desk like an Olympic figure skater bringing home the gold. The company also offers a service whereby you can have any mouse pad outfitted with a piece of C4, transforming that ordinary pad into a power user's dream.

www.cshyde.com

DREAM MACHINE 2010: 16GB OF RAM AND A 4TB DRIVE?

The makers of this year's Dream Machine dream about the future

SENIOR EDITOR GORDON MAH UNG: In 2010, the need for multiple hard drives and multiple optical drives will continue to drive the demand for large tower enclosures, and it's likely that the BTX spec will be standardized by then. Liquid or phase-change cooling will be standard for power rigs. Dream Machine 2010 will pack a CPU with four or more cores integrated into a single die, 16GB RAM (8GB will be commonplace by then), and 4TB of storage running on SATA-III. It will lack the BIOS as we now know it, but sadly, we'll still be using a mouse and keyboard to play games and run the PC.

ASSOCIATE EDITOR JOSH NOREM: Dream Machine 2010 will feature a processor with six cores running at 10GHz. Its videocard will be from nVidATI (the two companies will merge in 2008) and will feature 2GB of onboard memory, which will allow it to run *Half-Life 4* like buttah. The Serial ATA hard drive will boast 2TB of storage, and the optical drive will use 200GB dual-layer discs.

FEATURES EDITOR LOGAN DECKER: The Dream Machine of 2010 will fit easily in my back pocket. All my applications, preferences, work, and personal data will go wherever I do and will be available to me at all times. The device will be able to harness the power of an external processing grid and be able to wirelessly link up to any of the ubiquitous displays you'll find embedded in windshields, tabletops, and elsewhere. One thing the Dream Machine will not have is a hard drive. The weakest link in the PC data chain will finally be laid to rest by holographic storage and fiber-optic busses.

TECHNICAL EDITOR WILL SMITH: Dream Machine 2100 (codenamed "Sandbender") will sport a next-gen direct neural interface, complete with an adaptive interface and Class 3 intrusion countermeasures. Oh, you said 2010?

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Survival.

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Blood and Gore
Language
Violence

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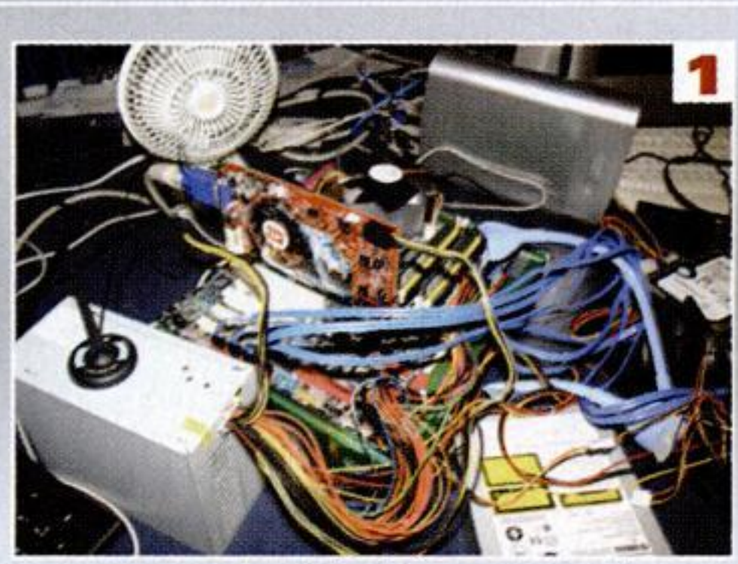
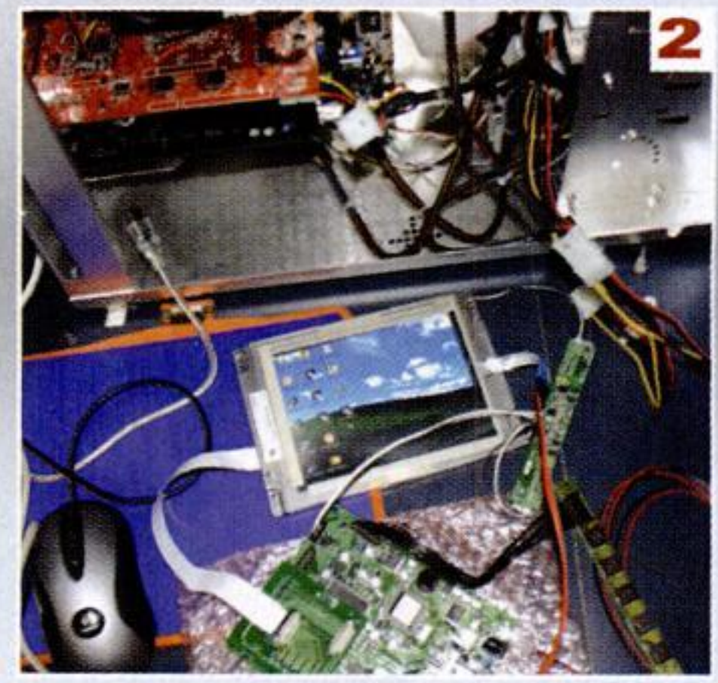
DREAM MACHINE 2004

THE MAKING OF THE DREAM MACHINE

Building the Dream Machine is always an ulcer-inducing process. But, as any system builder knows, it's incredibly rewarding to punch the power button of a hand-made PC and watch it come to life. To commemorate our hard-fought victory, we put together a touching behind-the-scenes look at the Dream Machine's creation. For maximum impact, slowly view these photos while listening to Yanni's *Dare to Dream*. And look for an even more in-depth photo essay at **www.maximumpc.com**.





1 In order to decide which components to use in the Dream Machine, we had to roll up our sleeves and test every configuration possible. We tested this

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BENCHMARK NUMBERS DON'T LIE

Leave it to *Maximum PC* to send megahertz madness out in style

With PCI Express and DDR2, Dream Machine 2004 heralds a new world order in computing. But, sadly, its construction also marks the end of an era. We hereby proclaim megahertz madness, which has infected the masses for decades, officially dead. In its place: more sober and efficient component designs.

Even Intel, the unabashed high priest of clock speeds, has publicly admitted through its recent change of strategy that a new age is dawning. By this time next year, both AMD and Intel should have shifted gears to multi-core CPUs in a single die, rather than the usual relentless series of clock speed increases.

So, it seems fitting that with one final huzzah, we built a 4GHz Dream Machine that fuses the wanton clock cycle greed of the past and present with the performance, efficiency, and enhanced functionality of the future. Fortunately, there's still some magic left in the wanton pursuit of clock speeds.

AND NOW FOR THE RESULTS...

Given the high speeds and benchmarking scores exhibited by the OEM systems we review every month—it seems like every month a cutting edge review unit breaks our Lab records—building a competition-blasting rig was no easy task. But we did it. We compared Dream Machine 2004's scores against all the desktop machines we reviewed over the last six months and found that it set records in four of our six system benchmarks.

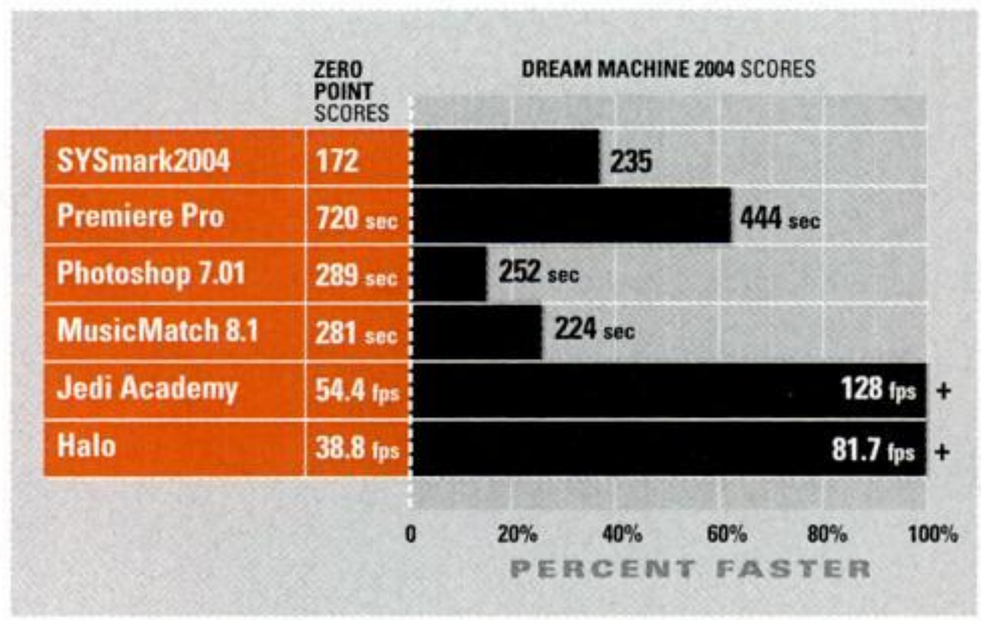
We absolutely smoked our zero-point system across the board. When you consider that our zero-point is an Athlon 64 FX-51, that's quite a feat. What's more, in *SYSmark 2004,* our overclocked 4GHz Prescott ran away from every Athlon 64 and Athlon 64 FX box we've ever reviewed. Even the Pentium 4 Extreme Editions—which AMD likes to complain are as common as Unicorns—got steamrolled.

In *Premiere Pro,* the benchmark delta is even more pronounced. The only machine that even comes close is Falcon Northwest's Frag Box Pro (reviewed on page 74), which is itself based on a Prescott. This year's Dream Machine is also king of the hill in our *Photoshop* action script. Only Velocity Micro's overclocked P4EE manages to nibble at its bumper. Finally, our 4GHz overclock really stretched *Jedi Academy,* primarily a CPU test these days, to the outer limits of benchmarking, pulling way out in front of the pack.

But clock speeds don't make all the difference. Sometimes architecture and cache play a more significant role, depending on the task. This is our explanation for DM2004's disappointing loss to Velocity Micro's ProMagix system (reviewed in June 2004) in *Music Match* benchmark. The ProMagix and its Pentium 4 Extreme Edition managed to squish our test WAV file into an MP3 two seconds faster. Damn you, Velocity Micro, and damn your Intel Pentium 4 Extreme Edition eyes!

Likewise, Falcon Northwest's Frag Box and its overclocked GeForce 6800 Ultra squeezed past the Dream Machine in our *Halo* tests by a couple of frames. Technically, you could call it a tie, but *we* can't. The fact that Falcon out-scooted us with a small formfactor is testament to the company's hardcore credentials, that's for sure.

But still, four out of six isn't bad. In fact it's great when you consider the rocket-fast PCs we're comparing it to. ■

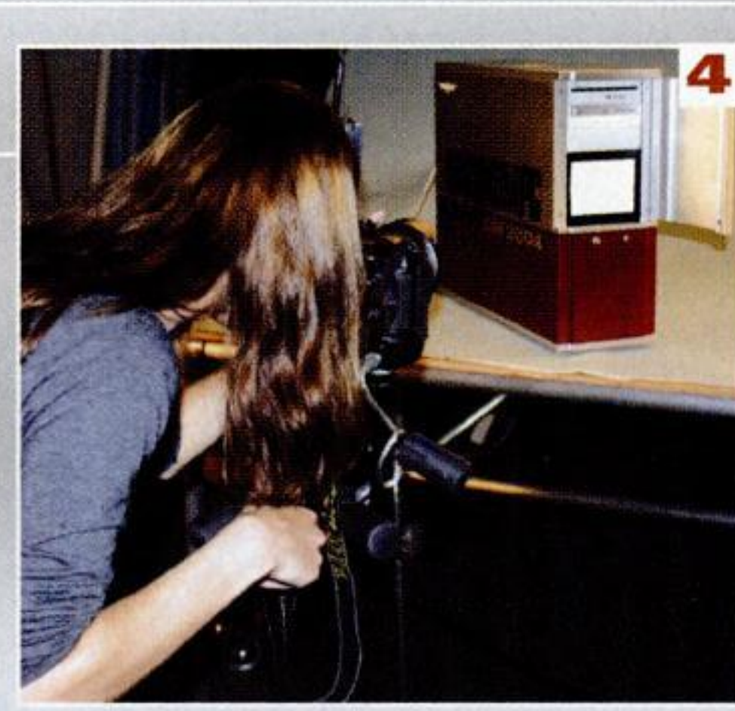


Our zero-point system includes: a 2.2GHz Athlon 64 FX-51, an Asus SK8N motherboard, 1GB of Corsair Registered TwinX DDR400 RAM, an ATI Radeon 9800 XT, a 250GB Western Digital WD2500JB hard drive, Plextor PX-708A DVD burner and a PC Power and Cooling TurboCool 510 Deluxe power supply.

year's machine with two different CPUs, six different videocards, two different hard drives using two onboard SATA controllers, and two different sound configurations—onboard HD Audio and the Audigy.

2 While the main components went through our rigorous suite of benchmark tests, we prepped the LCD touch screen that would be mounted in our case's lower 5.25-inch bays. After we unpacked it, we had it up and running on a test bench in a matter of minutes.

3 With testing complete, construction begins. While the system was built primarily in the Lab, Senior Editor Gordon Mah Ung took it upon himself to assemble the motherboard tray in a more intimate environment—his lap.



4 Lights! Camera! With the Dream Machine fully operational, the last step is the Dream Machine's big moment—a cover shoot close-up, care of photographer Samantha Berg. Work it, DM 2004!

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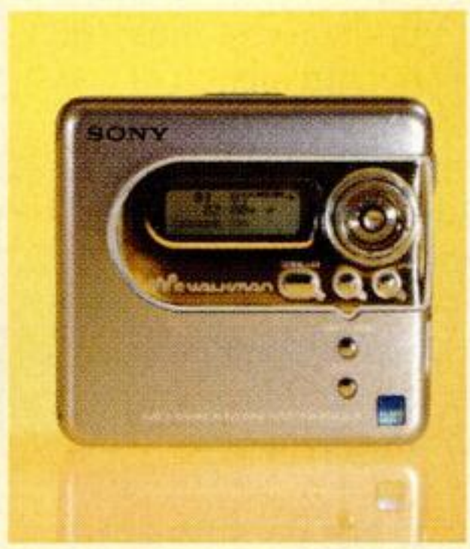
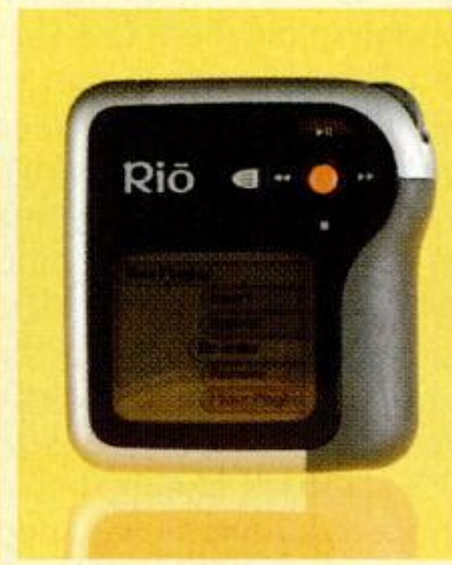
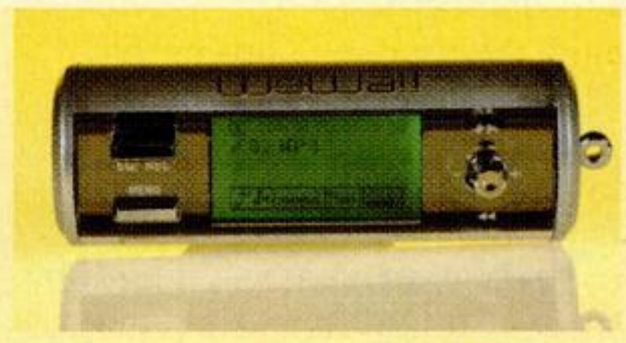
Can anyone BEAT the iPod?

We road test seven new MP3 players to find out!







The iPod has become as synonymous with MP3 players as Kleenex with facial tissue, Coke with soda, Mao with Communism. But there are more flavors of Communism than just the Chairman's, more brands of soda pop than just Coke, and a hell of a lot more MP3 players out there than just the iPod and the iPod Mini. Some are hard drive-based, some are flash-memory based, and all of them offer something different from you-know-what in terms of form and function.

It's worth mentioning that these days the iPod (as well as the iPod Mini) looks pretty uptight on the format side. It supports only the MP3 and AAC codecs, to the exclusion of alternatives such as the royalty-free, open-source OGG and, of course, Microsoft's WMA. As PC fanatics, we prefer to make our own decisions about what formats we listen to and how we listen to them. That's exactly what the players in this roundup have to offer.

Although we've yet to see an interface innovation from a PC-centric manufacturer on the level of Apple's iPod, we were pleased to discover that the level of sophistication in today's players is rising along with their capacities. All the players in this roundup, for example, support variable bitrate files, and only one neglected to use our ID3 tags for identification.

And that's just the beginning. Support for lossless compression and the open-source codec OGG is growing, and features like parametric equalization and unrestricted network support may eventually be enough to tarnish the varnish of Apple's fancy-pants players.

One thing that hasn't changed, however, is the horrible quality of even the fanciest bundled earbuds. We recommend you toss yours out immediately; all these players were tested with Shure's E3c earbuds ($130, www.shure.com). Now let's find out whether any of these MP3 players has what it takes to dethrone the mighty (or Mini) iPod.

—BY LOGAN DECKER

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Sony MZ-NH600D

FORMATS: ATRAC (will convert other formats)
BATTERY LIFE: 21.5 hours continuous
CAPACITY: 256MB

That MiniDisc players are sold at all these days is something of an anachronism. And as if there weren't already enough drawbacks to magneto-optical technology for portable music—slow spinup, long pauses during track searching, skipping, etc.—Sony made this MiniDisc player even more unpalatable by restricting playback to ATRAC-encoded files. The player "supports" WMA and MP3 files, but what this means is that when you transfer your MP3s or WMAs to the Sony by the only means possible—the bundled software—your non-ATRAC tracks are converted to ATRAC. Even worse, track conversions take an agonizing 20–30 seconds each, and we won't even get started on the issue of taking an MP3 file that's already had audio data stripped out and further degrading it through recompression.

Sony MZ-NH600D

Although the packaging boasts that the MZ-NH600D can "store 45 hours of music," the fine print notes that this is based on a 48kb/s bitrate. Upping the bitrate to a more reasonable 256kb/s results in a little more than two hours of music per 1GB disc. The sound quality was acceptable but not exceptionally sharp, likely the result of recompression.

Navigation on the MZ-NH600D uses a jog dial that sports a ring of tiny tactile buttons that feel like sharp pins. It took us nearly 10 minutes of reading the manual to figure out how to change the equalizer settings, and the miniscule joystick in the center of the wheel kept taking us out of the menu when we finally got there. The unit is encased in cheap plastic that flexed in our grip, and Sony skimped further by not including a line-in jack for recording directly to MiniDiscs.

We know there are still MiniDisc fans out there and the MZ-NH600D is compatible with older iterations, so for the benefit of all three of you, we'll concede that the media is rugged. Nonetheless, you can probably guess our verdict.

MAXIMUM PC VERDICT: 4

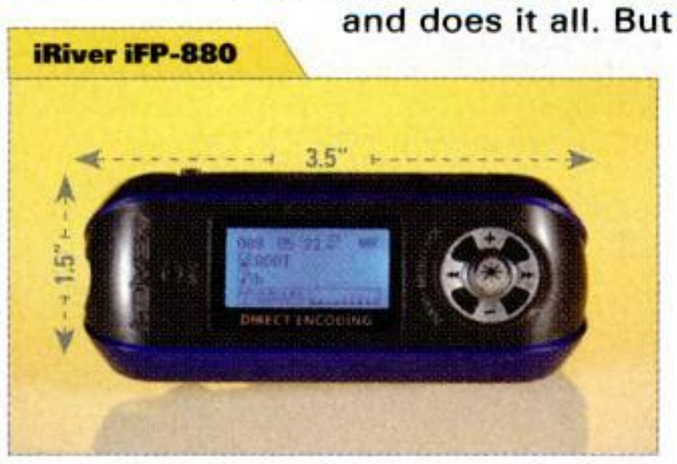
+ OBOE: Backward-compatible with older MiniDiscs.
− KAZOO: Otherwise unhelpful to music lovers.
$200, www.sonystyle.com

iRiver iFP-880

FORMATS: MP3, WMA, OGG
BATTERY LIFE: 32 hours
CAPACITY: 128MB

Apparently, iRiver wants to be to MP3 players what Plextor is to optical drives—the company that knows it all and does it all. But the iFP-880 is most definitely not a showcase of the company's tremendous ambitions. First of all, the capacity is limited to a pathetic 128MB, just enough for a walk down to the corner store or a bathroom break (the iFP-800 series is available in capacities up to 1GB). Furthermore, the iFP-880 does not show up in Windows Explorer as a removable storage device like Creative's nifty Muvo NX (which sports 512MB of storage to boot); as with so many other players, you're forced to use a proprietary app for operation, which is particularly annoying—and ridiculous with such a small capacity player.

iRiver iFP-880



The relative competence of most MP3 decoder chips means the quality of the bundled headphones and earbuds usually makes the difference in a player's sound quality. But we can't deny that, even at its default settings, the iFP-880 sounded a cut above most of the other players in the roundup—absolutely crisp and clear even at the loudest volume (which was unfortunately less loud than we like it).

The weird potato wedge–shape of the iFP-880 seems gimmicky and attention-starved at first, but it's actually practical and fit comfortably in our hands. Furthermore, we never inadvertently pressed buttons while the player was in our pockets.

Taking a cue from a certain red-colored pocketknife, the iFP-880 folds in more features than many hard drive–based players, including a five-band adjustable equalizer, FM tuner, OGG support, and the ability to record from the FM tuner, the built-in microphone, or an external source via the line-in jack.

It trumps other flash-based players in terms of sound quality and useful features (note "useful"), but the limited

CODEC-OGRAPHY

MP3, AAC, OGG—what's it all mean?

Codecs (a contraction for coder/decoder) do for audio and video what ZIP compression does for data; they allow files to be reduced to a fraction of their original size. Data compression schemes rely primarily on finding repeating blocks of information and substituting them with shorter placemarks, but the massive complexity of audio and video files renders this method inefficient and ineffective for multimedia files, at least as a primary approach. MP3 audio compression was developed by Germany's Fraunhaufer Institute, which managed to drastically reduce the size of an audio file without seriously degrading the fidelity by tossing out frequencies beyond the range of normal human hearing and adjusting the amount of bits used to encode audio every second.

When Fraunhaufer made a killing by demanding royalties for the use of its technology after it had become a de facto standard, other companies, salivating at the opportunity to compete in the future of multimedia distribution and be paid richly for it, began to create codecs of their own.

The first question people ask about the different codecs available today is always: Which one is the best? And the answer is, of course: It depends. Important factors include what kind of player you have and what formats it supports; what you do with your files (Do you trade them? Is absolute fidelity necessary?); and how prejudiced you are ("Screw Apple"). Because MP3 remains the de facto standard, alternative codecs have to offer something MP3 does not, be it higher quality, smaller file sizes, or compatibility with this or that online music service. Here's an overview of the most popular alternatives and their advantages.

MP3PRO
Extension: MP3
Developed in part by patent-owner Fraunhaufer, MP3Pro was

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capacity and the requirement of a proprietary application for management is devastating.

MAXIMUM PC VERDICT: 6

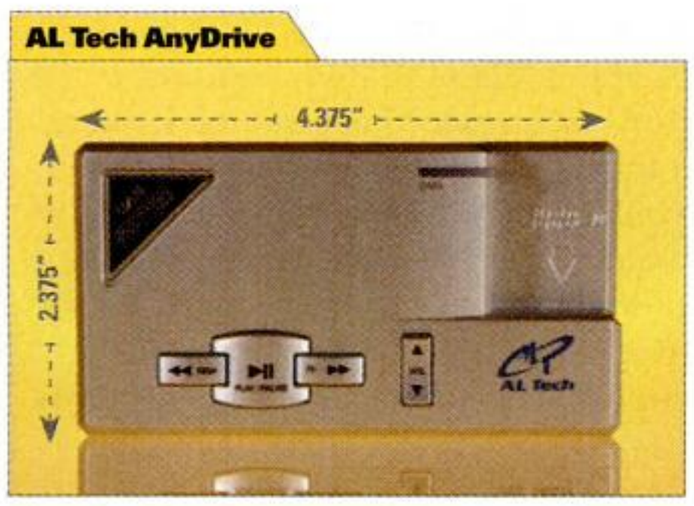
HARP: Oodles of features and great sound.

UKULELE: Extremely limited capacity, and proprietary software.

$130, www.iriver.com

AL Tech AnyDrive

FORMATS: MP3
BATTERY LIFE: N/A
CAPACITY: N/A



The AnyDrive is a combination MP3 decoder and FM transmitter, but it has no internal memory of its own. Instead, you plug a USB key—any USB key—loaded with MP3s into the built-in USB port, and it will transmit them to your FM radio for playback. Playback and volume controls are built into the AnyDrive.

The inclusion of a cigarette lighter power adapter strongly suggests the AnyDrive was meant for playing music through your car's FM radio. It does do this, but unfortunately, it also picks up noise from the car itself! The result was music that had a squealing backdrop reminiscent of early Public Enemy, rising and falling as we sped up and slowed down. The AnyDrive will transmit on 14 frequencies between 87.7MHz and 107.9MHz, but the unwelcome shrieking sounds were present no matter which frequency we tried.

To make matters worse, you have to fuss with four recessed DIP switches in order to adjust the transmission frequency (a safety pin works brilliantly for this task). We grimly imagined some doofus trying to manage these hard-to-reach switches while driving. This leads us to our final point: While the AnyDrive may not be a great MP3 player or FM transmitter, it is a fine advocate for the virtues of defensive driving.

MAXIMUM PC VERDICT: 2

TIMPANI: Will play and transmit MP3s from your USB key.

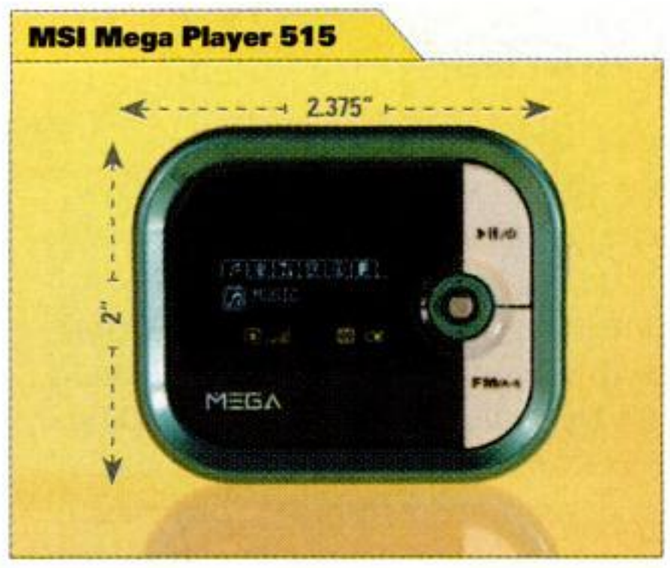
TRIANGLE: Will play screeching from your car's engine, too.

$60, www.merconnet.com

MSI Mega Player 515

FORMATS: MP3
BATTERY LIFE: 15 hours
CAPACITY: 128MB

It's shaped like a soap dish and its trim is the color of a hotel mint. Those are pretty unique attributes in an MP3 player. But what really sets the Mega 515 apart from the others is that it's the only player in this roundup—in fact, the only device thus far to be formally reviewed by *Maximum PC*—that integrates an OLED display. From the looks of it, the technology is everything we hoped for. The display is brilliantly visible even in direct sunlight and at any angle—even nearly horizontal. Is this crucial in an MP3 player? No. Is it usefully cool? You betcha.



But back to the main event—music playback. Although our review unit had a cramped capacity of 128MB (the Mega 515 is available with up to 512MB), it's at least manageable through Windows Explorer (which also allows data files to be transported on the player, in the unlikely event you have any room for them). And for the price you'll find a reasonably large number of features, including an FM tuner, voice recorder, a lithium-ion rechargeable battery (nonremovable). The sound is on par with far more expensive players, although the volume stops below the pain threshold and volume adjustments are limited to 10 gradations.

Unfortunately, MSI committed a number of rookie design transgressions. The Mega 515 is hobbled by a USB 1.1 connection, supports only MP3 and WAV formats, and was the only player in the roundup that didn't acknowledge ID3 tags. While highly recommended for curiosity collectors, the rest of the world will be much happier with a louder and more capacious player.

MAXIMUM PC VERDICT: 6

DIDGERIDOO: Beautiful OLED screen and good sound.

HARPSICHORD: Small capacity and USB 1.1.

$120, www.msicomputer.com

→

designed with file size reduction and network streaming in mind; as such, it shines only at very low bitrates. With the price of flash memory descending and hard drive players becoming ubiquitous, most people want better quality, not smaller file sizes. Our own listening tests fell far short of an epiphany. As far as portable audio is concerned, MP3Pro is so dead manufacturers don't even bother listing support for it anymore.
Our take: Moribund.

AAC
Extension: AAC, MP4

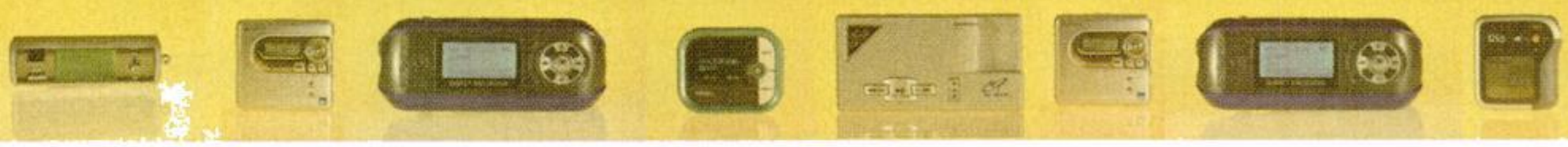
The launch of iTunes elevated Apple's codec from an also-ran to a major player. The codec's performance is fine (although we've found it emphasizes treble over bass), but limited support exists for portable players manufactured by companies whose CEO isn't surgically grafted to his turtleneck.
Our take: The iTunes music store will keep AAC buoyant, but iTunes alone isn't enough to elevate it above MP3—the lingua franca of digital music.

OGG VORBIS
Extension: OGG

OGG is the free, open-source alternative to MP3 compression. OGG files tend to sound better than MP3 at the same bitrate, but the difference is slight.

If you compress audio tracks with recent OGG releases, you'll notice that instead of being given the option of selecting a recording bitrate, you'll be asked to choose a quality "level" between 0 and 10, with 0 being the lowest quality setting and 10 the highest. We recommend 6, which is roughly equivalent to 192kbps.

OGG is growing in popularity in part because it works well, costs nothing to implement, and is also a nice alternative to the lingering threat of market dominance by a single entity. We just like how it sounds.
Our take: OGG is a star that's only begun to rise. We hope. →



Rio Karma

FORMATS: MP3, WMA, OGG, FLAC
BATTERY LIFE: 13 hours continuous
CAPACITY: 20GB

The effortless hardware interface that made the iPod so popular hasn't been bested by any other player, including the Rio Karma. But—and this is big news, considering Apple's dominance in this category—the Karma sports enough features to make it the only player we tested that held its own in a head-to-head comparison. When we took into account its increased functionality and the significantly lower price, we find ourselves convinced that, for some users, this MP3 player will feel *superior* to the iPod.

On a primal level, the Karma is a thrill to hold in your hand, with its boxy palm-sized shape and comfortably rounded corners. Like the iPod, all the playback features can be manipulated with one hand. Even straight out of the box with its default settings, the Karma's sound quality was matched by only two other players in this roundup, producing brilliant, full tones without any noise or the airiness typical of cheap players. Furthermore, the bass sounds keep their shape without degenerating into mush.

Of course, if you want to get particular with your music, you can still access simple bass and treble controls, alternate EQ presets, and add up to three custom settings via a five-band parametric EQ mode. And while good MP3 players get loud enough to hurt, the Karma gets loud enough to *kill*.

A recharging dock is included, but unlike the iPod's, it's more than just a porta-potty for your player. The dock includes an Ethernet port that makes your player a network-accessible device, which means you can access it from any other networked PC, like your living room's media center, for example. The player itself is endlessly configurable, with options to customize what information is displayed on the generous-sized screen, cross-fade between tracks, and how to resume playback after it's been turned off.

The Karma has a serious drawback in that you need proprietary software to manage your music and, even worse, you need a proprietary application just to load data files onto the player! Sadly, this limits the usefulness of the 20GB hard drive, and we've yet to find an acceptable software work-around for this shortcoming.

Still, as far as MP3 players go, the Karma is fully loaded with the kind of versatility, flexibility, and power we like.

MAXIMUM PC VERDICT: 9

+ THEREMIN: Small, reasonably priced, and feature-rific.
− TAMBOURINE: Requires proprietary software to manage.

$300, www.rioaudio.com

Kanguru Micro MP3 Pro

FORMATS: MP3, WMA
BATTERY LIFE: 13 hours continuous
CAPACITY: 512MB

A disastrous product is always a fabulous addition to any roundup, and Kanguru came through in this respect. The playback of the Micro MP3 Pro sounds as if a Hattori Hanzo sword cut out the low-end and took a few slices from the midrange as well. More than one editor likened its audio quality to ye olde cassette tapes. And don't bother with the equalizer—we tried it, and it didn't help. Although the Micro MP3 Pro packs a generous 512MB of flash memory, this capacity is cruelly paired with a USB 1.1 transfer rate which instantly quelled our enthusiasm.

Although a voice recorder and driverless operation (making it accessible through Windows Explorer) are nice touches, it doesn't make the music sound any better. The Micro MP3 Pro takes a seat at the ass-end of the MP3 player spectrum. We can't recommend it in good conscience.

MAXIMUM PC VERDICT: 3

+ BASS DRUM: Not a bad price for 512M.
− COWBELL: Horrible sound, USB—oh no!—1.1.

$220, www.kanguru.com

CODEC-OGRAPHY *(continued)*

WINDOWS MEDIA AUDIO

Extension: WMA

Some swear by the superior audio quality of WMA. Others insist that WMA encoding produces quality sound but alters the "mix" of the original. What is generally agreed upon, however, is that WMA produces files smaller in size than MP3 tracks encoded at the same bitrate.

Our take: The point may be **moot.** Microsoft will never pull the plug on this baby. Expect **it to remain** ubiquitous, and supported by most portable players. **If you're** happy with WMA and **don't** own an iPod, we see no reason **to switch.**

LOSSLESS CODECS

Lossless codecs like Windows **Media Audio 9 Lossless, Apple** Lossless Codec **and the open-source FLAC differ from lossy ones** in that they don't **eliminate any audio information during compression,** so **the compressed tracks they create are essentially** identical **to the originals. Although you'd be lucky to achieve** anything near a 50 percent **compression ratio using a lossless** encoder, these codecs **are becoming more popular as PC users** liberate themselves from **CDs and archive everything to their** hard drives.

Our take: Few people engage in online file sharing of these enormous files, so the popularity contest between lossless codecs is pointless. That said, we recommend going with FLAC. You'll find tons of information on the web about using FLAC and integrating it with your CD ripping application, and you can be fairly assured the format won't suddenly be shackled by "digital rights management" in the future.

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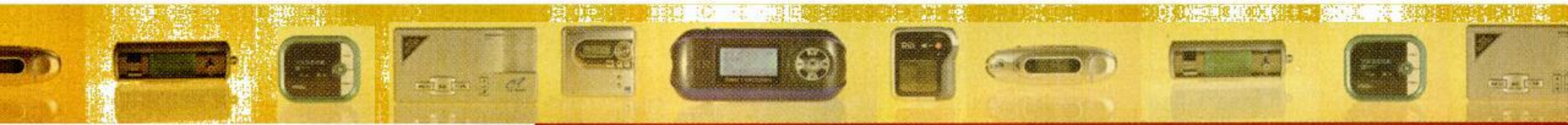
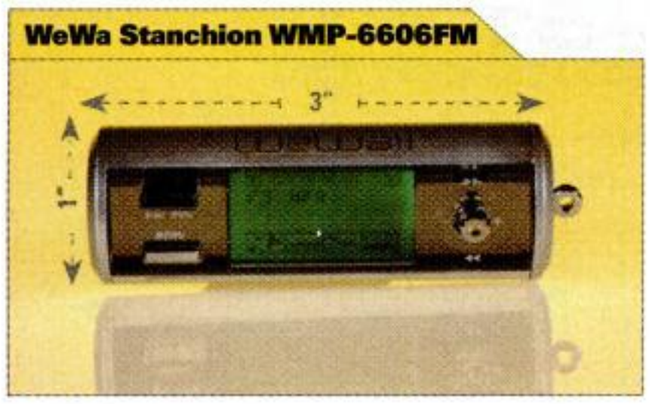


WeWa Stanchion WMP-6606FM

FORMATS: MP3, WMA, WAV
BATTERY LIFE: 14 hours continuous
CAPACITY: 256MB



Here comes another irrepressible MP3 player that dares to stand out from the crowd by naming itself after a framework for confining cattle! The implications are disturbing, but at least the quality of the sound pouring forth from this barrel-shaped MP3 player placed it in a three-way tie with the Rio Karma and the iRiver iFP-880. That's a pleasant surprise from a relatively obscure manufacturer. There are hints of design genius here, too: The headphone jack, for example, triples as a line-in jack *and* as a USB connector.

For a flash memory–based player of its size, the Stanchion packs an unusual number of features, including an FM tuner, voice recorder with a built-in mic, and a small but impressive high-resolution display that can be backlit with your choice of seven Vegas-on-acid colors.

While we appreciate the Stanchion's small size, we firmly believe that whoever came up with the control scheme should be beaten mercilessly with a stick. To turn on the unit, for example, you press the EQ button. Alright, OK. But to turn off the unit, you have to depress the navigation joystick for several seconds. With its cryptic icons and weird button assignments, digging into the menu system is more confounding than wandering around Paris drunk trying to find your hotel after dark. Sadly, while the audio quality was high, the Stanchion's highest volume level was among the lowest of the entire roundup.

We like the tiny size and rich sound, and if the controls had been given some extra work this might have been love at first sight. One thing Apple Computers taught us (besides how to laugh), is that small MP3 players don't have to sacrifice usability. Maybe WeWa will get it right the next time around.

MAXIMUM PC VERDICT: 3

- **SITAR:** Excellent sound quality and generous features.
- **BAGPIPES:** Scary menu system, and even worse controls.

$170, www.cirago.com.

TOMORROW'S PLAYERS TODAY

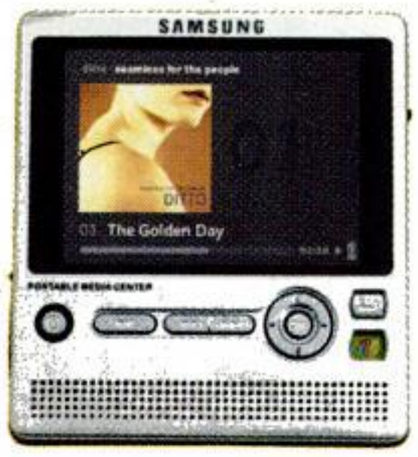
Portable video, smaller players, and humongous storage are a threat to piggy banks all over the world

MICROSOFT PORTABLE MEDIA CENTER

In a few short months, Microsoft hopes to land on the MP3 and media player category like a 747 with the Portable Media Center (PMC)—a standard upon which the company expects manufacturers to build an ever-evolving array of devices. Microsoft's spec requires USB 2.0 support, AV out, the presence of the green "Media Center" button, and the WinXP Embedded OS, but allows manufacturers to incorporate additional functionality like programmable buttons and FM tuners.

We recently got our hands on Creative's Zen version of the PMC, and found ourselves duly impressed with its potential. A 3.5-inch LCD screen displayed a bright, colorful interface that allowed us to quickly browse and select not just music, but videos, photographs, and even movies in full color. One nice touch we appreciated: When we sorted through our music collection, the Portable Media Center contained album art for each CD that had been ripped.

One of PMC's tangible strengths is its ability to synchronize easily with Media Center-based PCs. Using this combination, users will be able to quickly transfer recorded movies and TV shows, as well as their photos and music. (As an example, we transferred a one-hour episode of *Band of Brothers* to the device in less than three minutes.) Microsoft tells us that users of Snapstream's *Beyond TV* will also be able to move files onto their PMCs, and that content providers like Major League Baseball's MLB.com will allow users to download telecasts in their entirety.



Microsoft's PMC is a specification that allows hardware vendors like Samsung and Creative to build players of different sizes and shapes, yet still provide users with a consistent interface to listen to music and view movies, TV shows, and photographs.

The initial wave of Portable Media Centers—released by Creative, Samsung, and iRiver, will be available in October for between $400 and $600.

SONY NW-HD1

The first hard drive–based player to bear the legendary Walkman name, Sony's 20GB Network Walkman (NW-HD1) boasts a profile so slim it makes the iPod look like it needs a low-carb diet. At slightly more than a half-inch thick and three and half inches wide, the Network Walkman is the smallest digital music player to use a 1.8-inch internal hard drive. But will it inspire the same cult-like frenzy characteristic of English football fans and iPod users?

Information we've received from Sony cheerfully boasts that the Network Walkman "Plays back ATRAC3 Audio" and "supports MP3, WMA, and WAV." By "supports," we fear this means Sony's software will recompress our MP3s into its own ATRAC3 format, much like the MZ-NH600D MiniDisc player reviewed on page 46. If that's the case, well, size really won't matter.

The Network Walkman should be available by the end of the summer "for less than $200."

With its proprietary music format, will Sony's hard drive–based Walkman meet the same fate as the Dark Lord of the Sith?

CREATIVE LABS ZEN TOUCH

The original iPod got its nose bloodied over failing batteries; now, just as the bones set, here comes another punch from Creative Labs. The company offers its own take on a fancy interface with the 40GB Zen Touch, and also claims *three times* the battery life of the iPod (at an estimated—and quite astonishing—24 hours).

Like the classic iPod and the Network Walkman, the Zen Touch is based on a 1.8-inch hard drive. But the centerpiece of the design is the Touch Pad control in the center of the device that scrolls through playlists and tracks with just a light touch of the thumb.

The Zen Touch should be available by the time you read this, with an iPod-squishing price of $270. ■

With three times the battery life and its own patented interface, the Zen Touch hopes to trash the iPod in a decidedly un-Zenlike manner.

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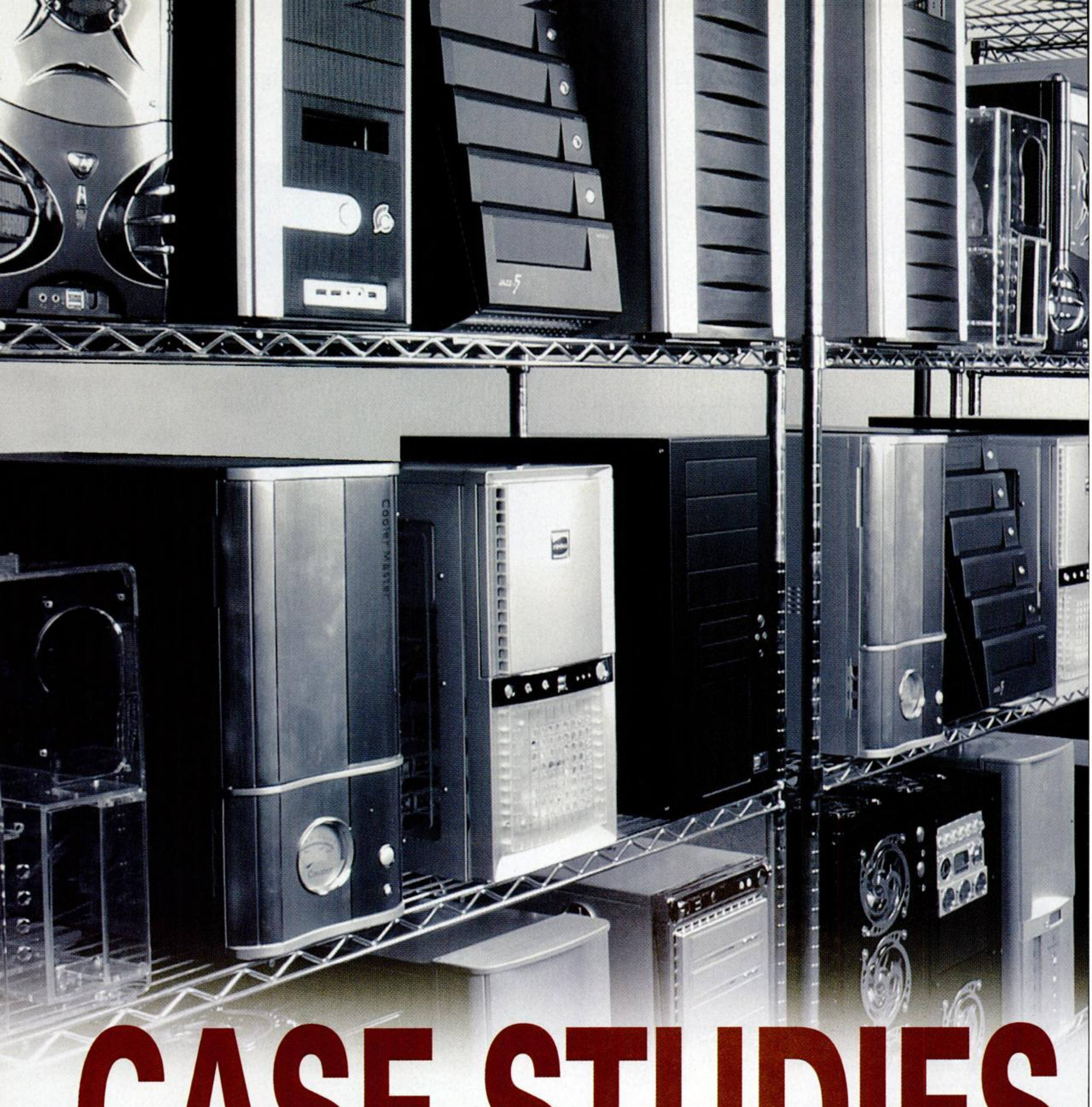

CASE STUDIES

We rounded up as many PC cases as our Lab could hold with one goal in mind: helping you choose the best ATX case for your needs.

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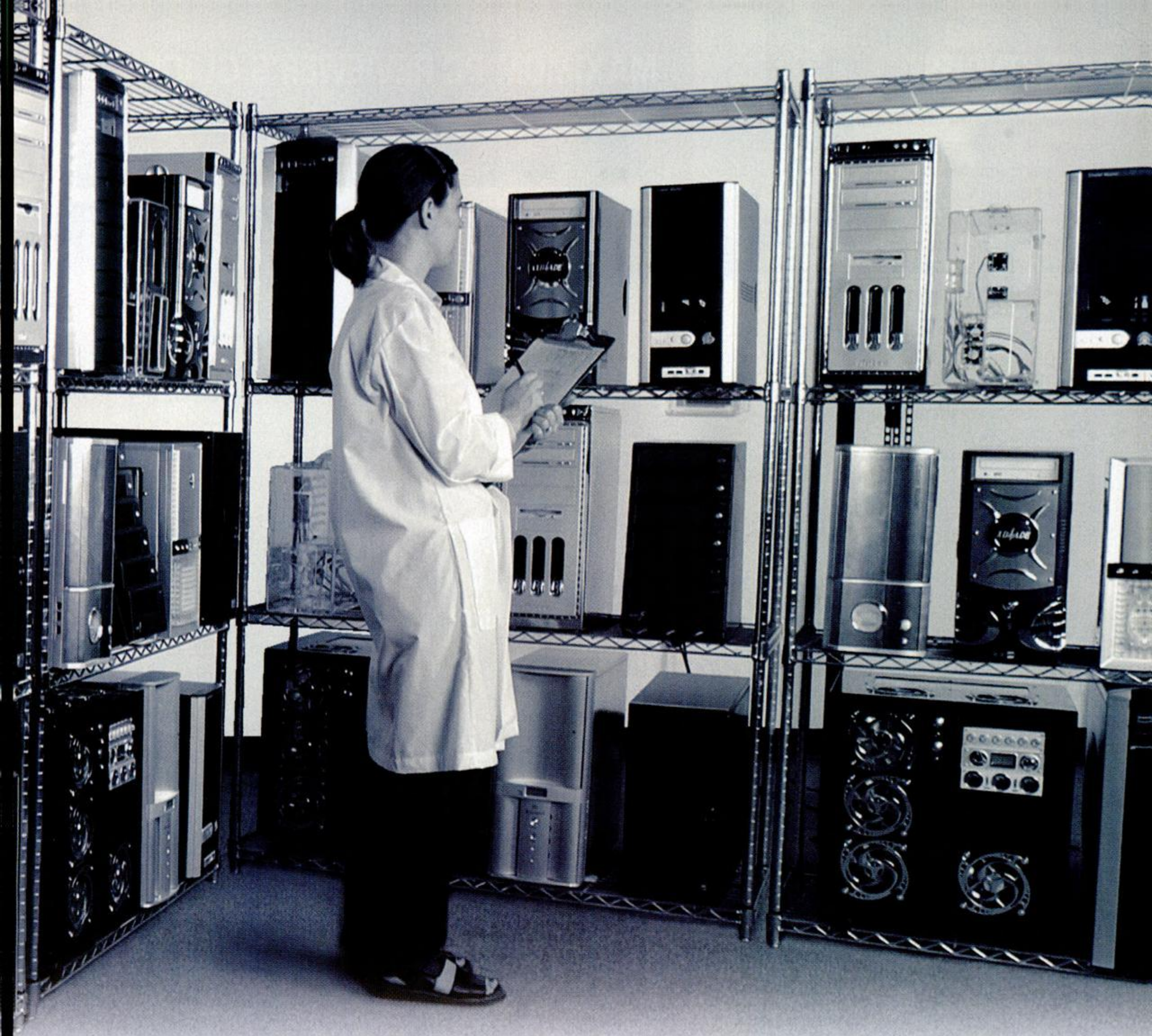

Like leg warmers, Cabbage Patch Dolls, and poignant soft saxophone solos, the beige PC is dead, and has been for years. In its place: a thousand different PC enclosures. Some are big, some are small. Some are light, some are heavy. Some are flashy, some are classy. Some are chrome, some are colorful. And some are downright ugly. But none of them are beige.

With such a wide variety available, it's tempting to grab the first cheap or attractive case you see. We deem this a bad idea. We've found that we hold onto our cases longer than our hard drives, videocards, CPUs, and even motherboards, which means that choosing the right case is a crucial decision.

The tricky thing about buying a PC case is that everyone has specific PC-building needs. With this in mind, it's important to consider the type of computer you're building before you buy the chassis. Even with the right mentality, case-hunting can feel pretty overwhelming. Hence this story—our most daring PC case roundup yet. We requested, tested, and reviewed the best cases on the market today to make things easy for you. All you have to do is decide which one is right for you, and you're set. And—on the off-chance none of these enclosures floats your boat—we've also included a detailed reviewer's guide that readily illustrates what the Maximum PC Lab experts look for when evaluating cases.

One final note: We've been talking about the new BTX formfactor for some time now, and while we're still excited about it, it will take at least a few years before this standard becomes prevalent. For now, ATX remains the formfactor of choice, and will for some time.

Now, let's get on with the roundup!

—E. WILL GREENWALD

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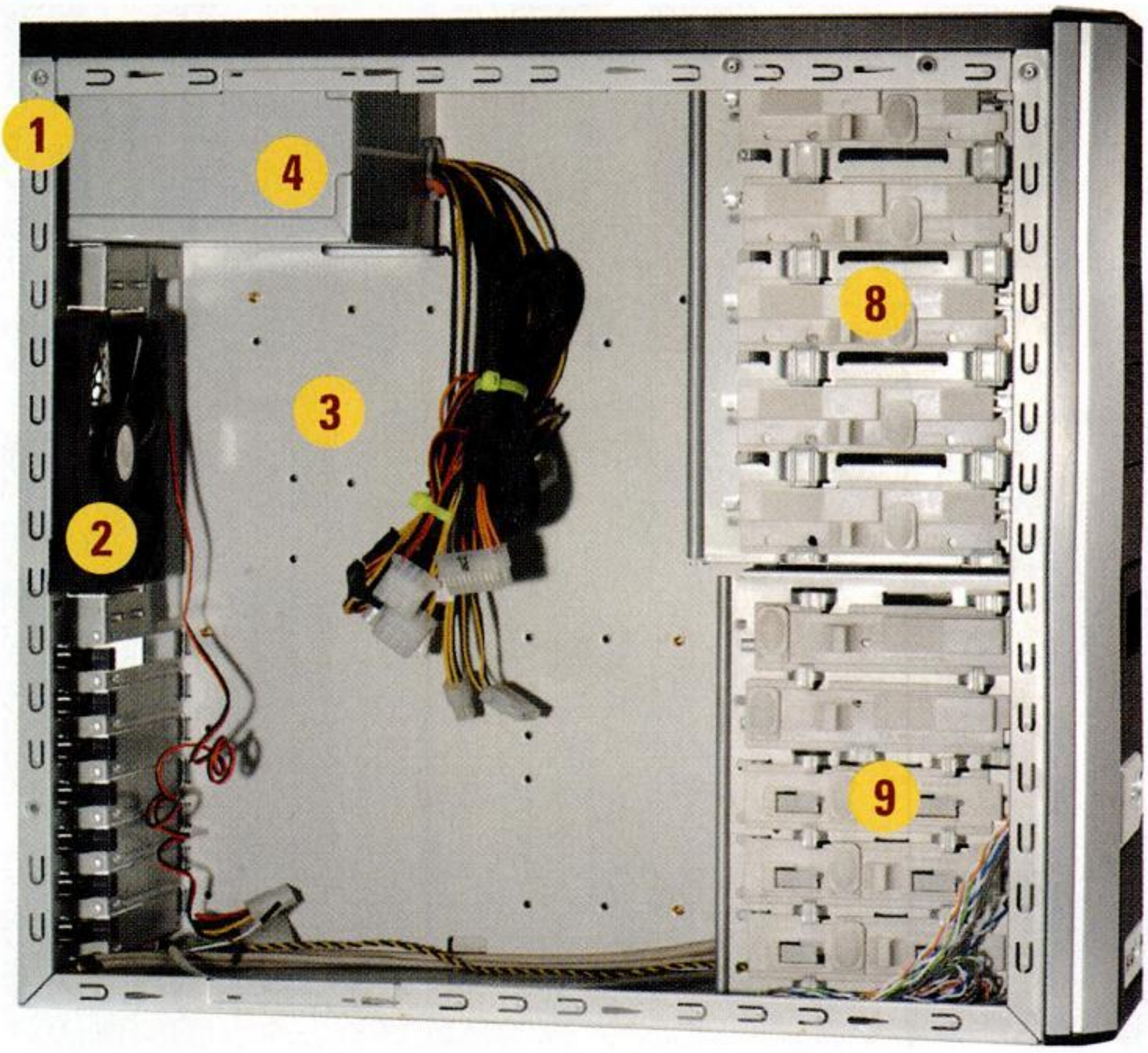
MAXIMUM PC REVIEWER'S GUIDE:
PC ENCLOSURES

Here's what our Lab experts look for when evaluating a case

Our emphasis is on real-world system building, so we do just that—build a system within each case. We install a mobo, optical drive, hard drive, videocard, and soundcard, and then fire it up to see how it performs in its "running state." Then we break it down. We note how easy it was to install all the parts, how cramped or un-cramped we were for space, and the time commitment involved in the assembly. Here are the particular details and how we judge them.



1 CASE CONSTRUCTION: Cases are built from a variety of materials, the most common being steel and aluminum. Steel is sturdy and inexpensive, but aluminum is much lighter and provides better cooling properties. Some cases are even made out of acrylic and are completely transparent, to show off your case's innards and lighting effects. We prefer all-aluminum construction when given the choice.

2 CASE FANS: Case fans help air circulate inside a case, keeping the parts nice and cool. Most cases include several fans, or at least places to mount them. The bigger the fans and the greater the number, the cooler (and louder) your computer will be. If you plan on running several hard drives and a high-end videocard, the case's cooling setup should be a primary consideration. We prefer a minimum of two 120mm fans—one in front to draw air into the case, and one above the AGP slot to blow hot air out.

3 MOTHERBOARD TRAY: All cases have a flat surface on which you attach the motherboard. Because it can get rather cramped inside a mid-size tower, some high-end cases let you remove the motherboard tray so you can install the motherboard and cards with greater ease. We look for a slide-out tray because it lets you assemble almost the entire PC outside the confines of the case and then slide everything back into the case in one fell swoop.

4 POWER SUPPLY UNIT (PSU): Power supply units provide your computer with juice. PSUs range in output from 250 watts to more than 500 watts of power. Because each component in a PC draws a bit of power from the PSU, a high-output power supply allows you to use more components in your PC than would a lower output supply. We recommend a minimum of 350W for a standard gaming system, and 450W or more for a fully loaded rig.

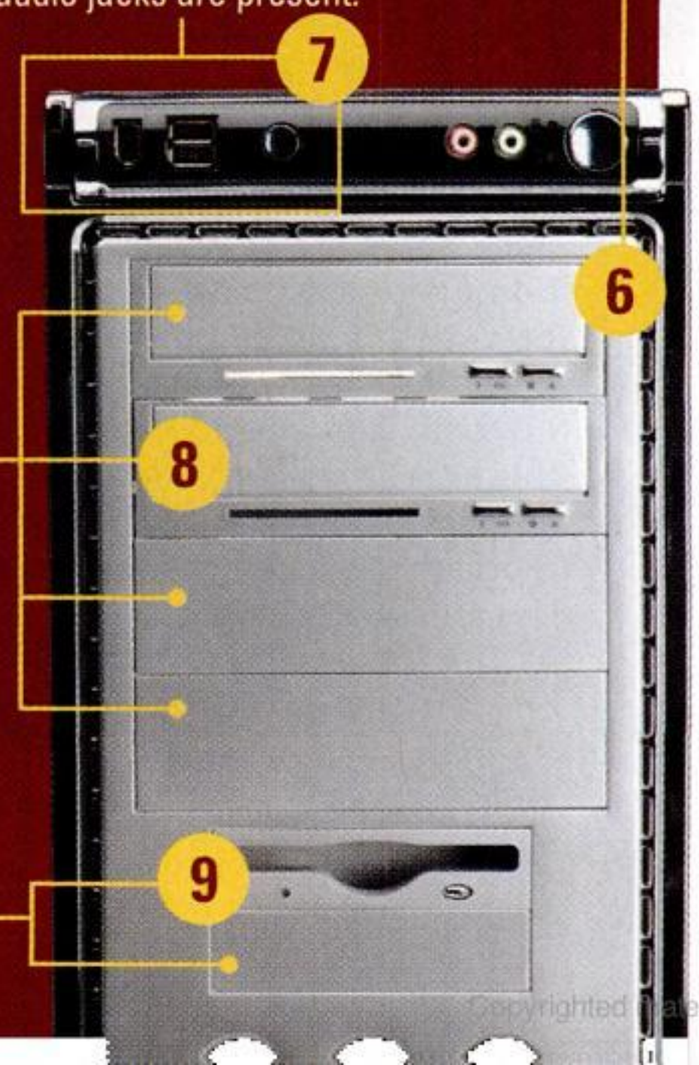
5 CASE WINDOW: Case windows have replaced the opaque case door of yore and make it possible to show off your PC's interior. They're typically made of acrylic. We don't require a window as some of the best cases don't include them. It's a matter of personal preference, really.

6 FRONT BEZEL: This is a case's detachable faceplate. Bezels vary from bland, plastic contraptions to smooth chrome jobbies and everything in between. The bezel doesn't have any features per say, but it's often a case's most distinguishing trait. Some bezels include a door that hides the 5.25-inch bays for a clean look.

7 FRONT I/O PORT: USB, FireWire, and audio jacks used to be found on the rear of one's PC, but it's a pain in the butt to crawl back there just to plug in a USB key, and thus the front I/O port was born. We need at least two USB and one FireWire port up front, but don't really care if audio jacks are present.

8 5.25-INCH BAYS: These bays are used primarily for optical drives such as CD and DVD writers. Their most popular secondary use is housing sundry case accessories such as fan controllers. Most ATX cases have four of these bays, which is more than enough . We demand at least three of these bays in a case.

9 3.5-INCH BAYS: These smaller drive bays are generally reserved for hard drives, floppy drives, and media readers. If you have more than one hard drive, the number of these bays is a critical consideration when shopping for a case. We require a minimum of four with a separate fan in front of the drive cage to keep our hard drives chilly.



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Chenbro Xpider II

With its web-patterned front bezel and strangely angular side window, a casual observer might think the Xpider II is Chenbro's attempt to cash in on *Spider-Man 2's* popularity. Be that as it may, this budget enclosure is an excellent mid-size tower that offers plenty of bang for not much buck.

The Xpider II feels solid, with a strong steel frame under its colorful plastic exterior. The case is easy to work inside of thanks to handy drive rails and a removable hard drive cage. Unfortunately, it has a plastic locking system for the PCI card slots, which we found awkward and flimsy and made us question whether our PCI cards would remain secure.

The front bezel maintains the spider motif with a web pattern and large metallic arachnid adorning the face. Well-stocked I/O ports hide just behind the small plastic door on which the spider sits.

The case's steel and plastic construction makes it a bit heavier than an aluminum enclosure, but it's rare to find a fancy aluminum case at this price point. In fact, the only real drawback to the Xpider II's budget price is that no fans are included, nor is a PSU.

MAXIMUM PC VERDICT: 9

- ➕ **GREEN GOBLIN:** Great case for the money.
- ➖ **DOCTOR OCTOPUS:** Awkward card-lock mechanism and gaudy looks.

$55, www.chenbro.com

Xoxide X-Blade Extreme

This mid-size tower is a budget system, but you'd hardly know that by looking at it. The front bezel is vaguely reminiscent of an Alienware case, thanks to the "eye" grills on the sides. It's not the most subtle design, but we dig the shiny logos and clean-looking custom-cut side window, which lies completely flush with the side and has a chrome fan built into its center.

Puzzlingly, while the X-Blade uses conventional screws for its side panels, motherboard, and PCI cards, drive installation is completely tool-less. The drive bays use rails that snap easily onto drives, and the hard drive cage can be removed with the twist of a thumbscrew. Tool-less designs give us warm fuzzies.

The case is made from heavy plain steel instead of lighter, more aesthetically pleasing aluminum. Also, the front I/O port conspicuously lacks a FireWire port; oddly, we found a small FireWire-shaped hole in the case where this port would normally reside.

With two included 80mm fans and room for two more, the X-Blade offers decent cooling capabilities. We weren't too disappointed about the lack of an included power supply given the low $70 price tag.

MAXIMUM PC VERDICT: 8

- ➕ **BLADE:** Looks nice, and includes tool-less drive features and a stylish window/fan.
- ➖ **BUFFY:** Steel construction, and tools required for PCI and mobo installation.

$70, www.xoxide.com

Antec Super LANBOY

Antec's Super LanBoy is a revamped version of the hugely popular LanBoy case, and adds several new features to the already ultra-light package. This new version holds even more hard drives than the older case, and also adds a filtered 120mm fan to the lower portion of the front bezel. Both are welcome additions. Two other cool new features are a completely tool-less interior and a handy tool/screws/memory-card drawer that pops out of the front bezel. And, like its predecessor, the Super LanBoy includes a carrying case. Not bad for a sub-$100 price tag.

Also like the original LanBoy, the Super LanBoy's greatest flaw is that it's so darn light we find ourselves doubtful it can withstand even the mildest abuse. The case sides and motherboard tray wobble and bend if too much pressure is applied, which made us a bit nervous when installing parts. While, we didn't experience any problems building the test system in this case, we felt like we were building a PC on a bed of egg shells. The basic configuration we reviewed doesn't include a power supply, but Antec offers a few variations that do.

MAXIMUM PC VERDICT: 8

- ➕ **SUPERMAN:** Super-light, lots of neat features, and a clean internal design.
- ➖ **BIZARRO SUPERMAN:** Feels flimsy and lacks a front FireWire port.

$90, www.antec.com

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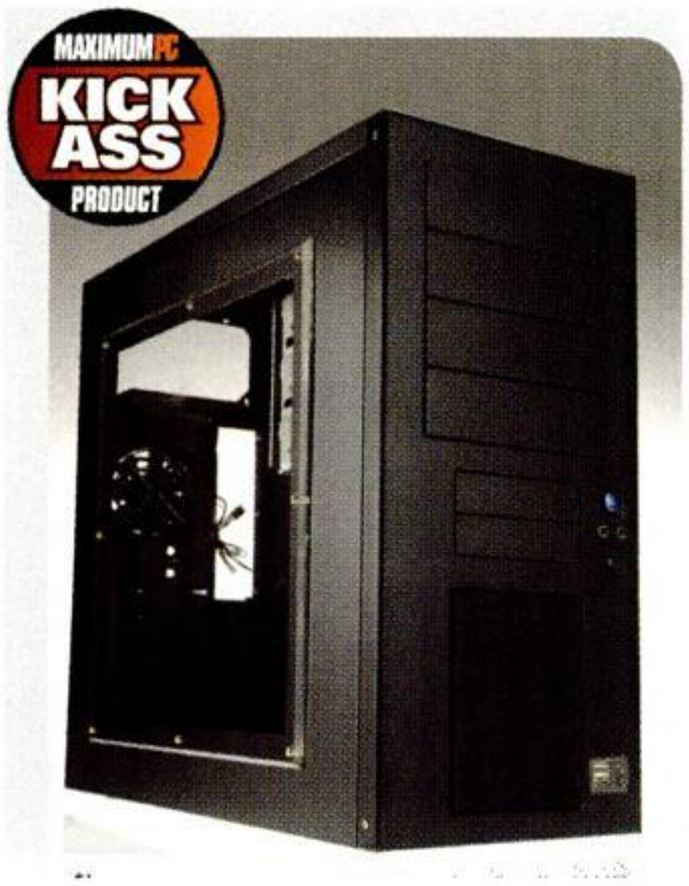


Kingwin KT-424

This mid-size tower looks unassuming and generic, but behind its nondescript front bezel is an extremely well-built case. The KT-424 is made of aluminum but has a solid, sturdy feel to it, and features the kind of niceties we favor, such as tool-less construction and a slide-out motherboard tray.

The case is a cinch to work with, mainly because of the aforementioned mobo tray and push-lock drive bays. Even the PCI slots are tool-less, so swapping parts in and out of this case is relatively painless. Unfortunately, the front I/O panel is awkwardly placed in the lower right corner of the bezel, tucked behind a tiny window. The I/O panel also lacks audio jacks, but does include two USB 2.0 ports and a FireWire port.

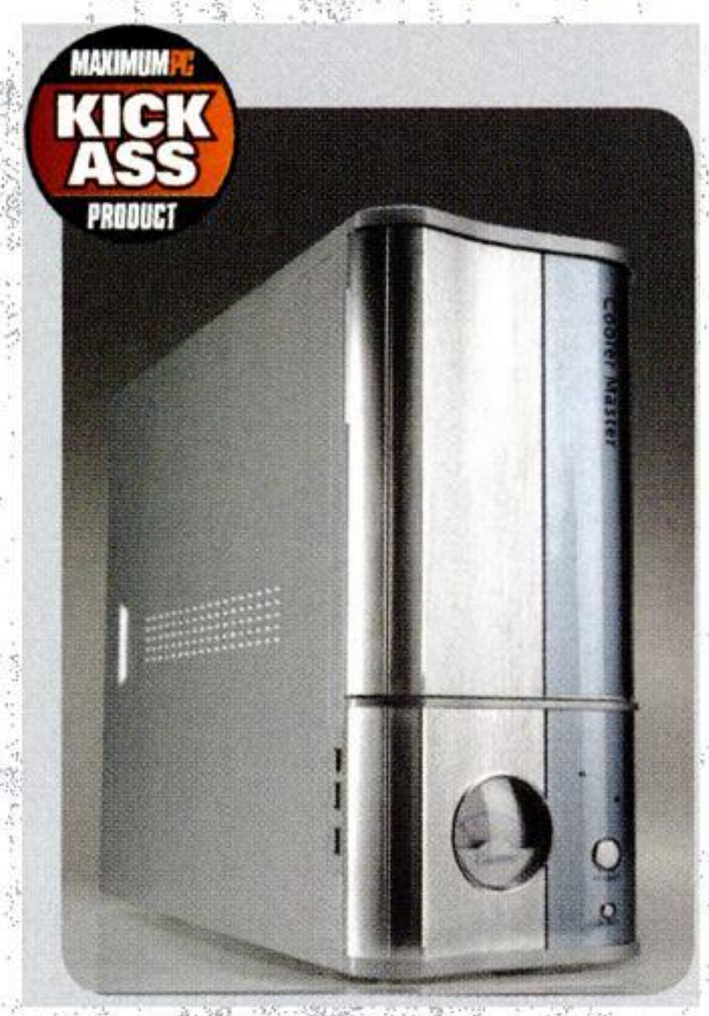
Cooling is provided by two fans up front and one in the rear, and the front fans also include a filter over them to keep dust and dander at bay. The case does not include a power supply.

We appreciate this case's classy, understated exterior, but its simplicity makes it seem almost "retro." Although it certainly doesn't go the extra mile in any one category, it covers all bases with aplomb.

MAXIMUM PC VERDICT: 9

- **HULK:** Great features, classic look, and tool-less design.
- **THING:** Uninspired design, and no audio jacks.

$100, www.kingwin.com



Cooler Master Cavalier 1

The Cavalier looks like the little sister of Cooler Master's extremely popular Wave Master case, with a similar-but-less-curvy front bezel. Smaller than the Wave Master both in length and height, this case is decidedly more sober, with a subdued paint job and an old-school analog dial on its face that measures sound output. Why sound output? We don't know—a temperature or fan speed monitor would have been much more useful.

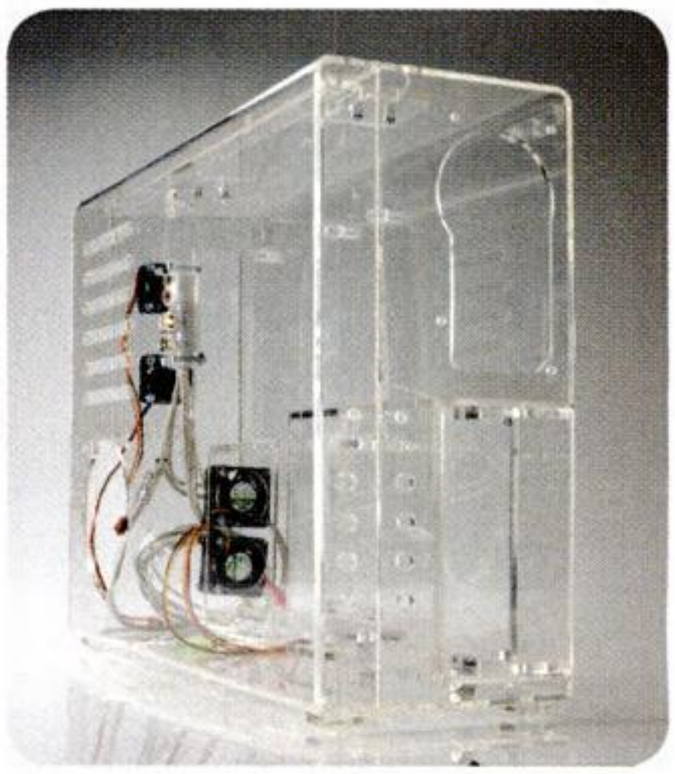
Once we got past the inexplicable sound meter, we were impressed with Cooler Master's characteristic sturdy construction and appealing design. The case itself is easy to work with; its tool-less features make component installation a snap. You'll seldom have to pick up your screwdriver, either, as both drives and device (PCI) cards are secured by surprisingly sturdy tool-less locking systems.

Sound gauge aside, the Cavalier 1 is a solid, tasteful case, with all the features we've come to expect from Cooler Master.

MAXIMUM PC VERDICT: 9

- **CATWOMAN:** Pretty looks and great lock ing systems.
- **CHEETAH:** Um, what's with the sound gauge?

$125, www.coolermaster.com



ClearPC Secret Agent Briefcase

The Secret Agent Briefcase takes the concept of a clear case one step further by fashioning an ATX case out of a briefcase-shaped enclosure for easy transport as well as inspection by drooling onlookers. While it's a novel design that's fairly well-built, the case is not suited for use as a full-time ATX case, but rather for periodic LAN gaming or "show purposes" because of its lack of electrical grounding.

The case fits any standard ATX motherboard, and can accommodate two optical drives as well as two hard drives. Cooling is provided via a 120mm fan mount over the PCI slots as well as four 40mm fan mounts (two pairs of two), which allow the case to maintain its slim profile. All in all, we found the included cooling to be adequate.

Our main complaint with this case is that we experienced difficulty securing the optical drives because of slightly misaligned screw holes. And because the case is clear, there's nowhere to really "hide" cables, so our case looked like a portable snake pit when assembled. Finally, one of the door hinges repeatedly came loose during our testing process.

The Special Agent is certainly one of the more intriguing clear cases we've tested, but we wouldn't recommend it as a standard desktop case because of its fragility and lack of grounding.

MAXIMUM PC VERDICT: 7

- **PLASTICMAN:** Slim design, novel approach, and sturdy build.
- **SPASTICMAN:** A lot of assembly required, imprecise screw holes, and heavy when full.

$150, www.clearpc.ca

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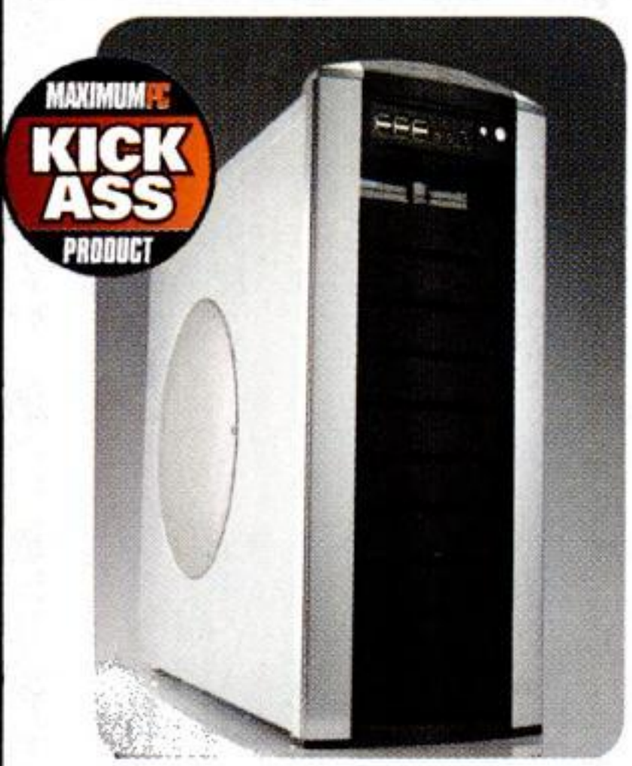

Cooler Master CMStacker

The CMStacker is a big, beautiful full-tower case with so much interior room you could almost sublet the extra space to house other people's PC parts. Like most Cooler Master enclosures, the CMStacker comes loaded with almost every feature and doodad known to man, making it worth the extra dough you'll cough up to own it.

The CMStacker sports an all-aluminum construction, which makes it surprisingly lightweight given its size. It's also extremely rigid and, like the Take 5 enclosure on the next page, features a ventilated exterior on all sides except the bottom for improved airflow.

Hardcore PC builders will appreciate the fact that this case supports up to eight case fans, can accept ATX *and* BTX motherboards, and is also dual-PSU ready. Be warned, though—we tried the BTX conversion and found it time-consuming and difficult.

The spacious interior makes system building a walk in the park. It includes seven 5.25-inch bays in stock trim and up to 11 with some minor modifications. With bays running the entire height of the case, you can use as many optical drives, fan controllers, and cup holders as you want. The front I/O port is equally impressive, sporting a whopping six USB 2.0 ports, on top of the standard FireWire and audio ports. The CMStacker is even available with a case window, but does not include a PSU.

MAXIMUM PC VERDICT: 9

- ➕ **MR. FREEZE:** Spacious interior and front USB 2.0 ports aplenty.
- ➖ **CAPTAIN COLD:** BTX conversion is a P.I.T.A.

$170, www.coolermaster.com

Antec Performance One P160

The P160 is the big brother of the Super LanBoy, and features a much sturdier build and some additional features that *almost* justify its high price tag.

At the top of its shiny plastic front bezel is a slick I/O port that pivots upward 45 degrees and comes with a digital temperature gauge as well as the standard USB 2.0, FireWire, and audio ports. The case's cooling system concerns us, with just a single 120mm case fan and a mount for only one other fan in front of the hard drive cage.

We found the P160 easy to work with; it has a fair amount of room for a mid-tower enclosure. It has a lift-out motherboard tray that makes installation a bit easier, but we found ourselves wishing for a slide-out tray, which is even more convenient. Unfortunately, the tray holds only the motherboard, so PCI cards have to be removed before lifting the tray from the case.

With its clean design and solid construction, this is a decent mid-range case, but we're puzzled why it costs so much. Antec jokingly says the case is made from recycled fighter planes, but aside from its snazzy front bezel, not much sets the P160 apart from its competition.

MAXIMUM PC VERDICT: 8

- ➕ **IRON MAN:** Tilting I/O port is nice and temperature display is nice touch.
- ➖ **WAR MACHINE:** Exorbitant price; the lift-out motherboard tray is not as handy as a slide-out tray.

$170, www.antec.com

Thermaltake Xaser V Damier V6000A

First reviewed in the July 2004 issue. Pronounced `zaser`, this all-aluminum mid-tower features a lavish two-part front panel, including an outer door that covers the four 5.25-inch bays. Below the gigantic Thermaltake logo sit three built-in LEDs that can be toggled to light up, flash, or continuously illuminate the logo. Normally we're big fans of case lights, but in this instance, we find the cosmetic enhancement garish—a little too "Las Vegas" for our tastes.

The Xaser's design emphasizes user control. The top bay of the front panel holds the Hardcano, which lets you control the case's impressive six-fan array. An I/O port at the top of the case puts FireWire, dual USB 2.0, and dual audio jacks at your fingertips.

The side door of the case sports a large X-shaped window that would reveal more of the Xaser's interior if the view weren't obstructed by a swing-out fan holder for the PCI slots. The spacious interior features a screw-less design, with plastic tabs holding the PCI cards and drive rails for the three 3.5-inch bays in place. Sadly, there's no motherboard tray.

Overall, the Xaser offers a feast of features and ample cooling. And while the acid-flashback lighting effects will certainly appeal to some builders, we geezers think it's a bit over the top.

MAXIMUM PC VERDICT: 9

- ➕ **KID FLASH:** Well-made, plenty of cooling, and easy access.
- ➖ **IMPULSE:** Thermaltake logo plastered all over the case.

$170, www.thermaltake.com

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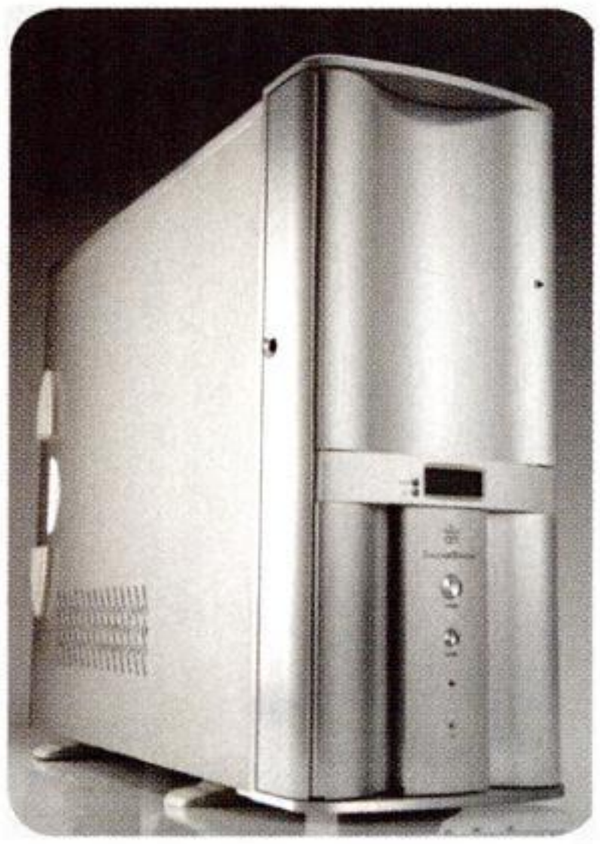


Silverstone Temjin SST-TJ05

Silverstone's newest tower is a drop-dead beautiful behemoth that is fully-loaded and bears a striking likeness to Cooler Master's famed Wave Master case. This makes sense, as we've heard that both cases were designed by the same person. The Temjin TJ05 combines many of the Wave Master's features—including a subtly curved front bezel—with the clean, neat design of Silverstone's Nimiz case (which received a 9 verdict and a Kick Ass award and is home to this year's Dream Machine). The front panel even has a small LCD screen that displays time, motherboard temperature, and other features.

The Temjin TJ05's interior is just as brilliant as its exterior. Maneuvering through the incredibly spacious case is a simple matter of turning thumbscrews and sliding plastic levers—no tools needed here. Every drive bay uses a rail that is stored neatly on the case's floor. PCI cards are secured using a set of plastic locks that, while not the sturdiest we've seen, work quite well. The only time you'll need a screwdriver is when installing the motherboard.

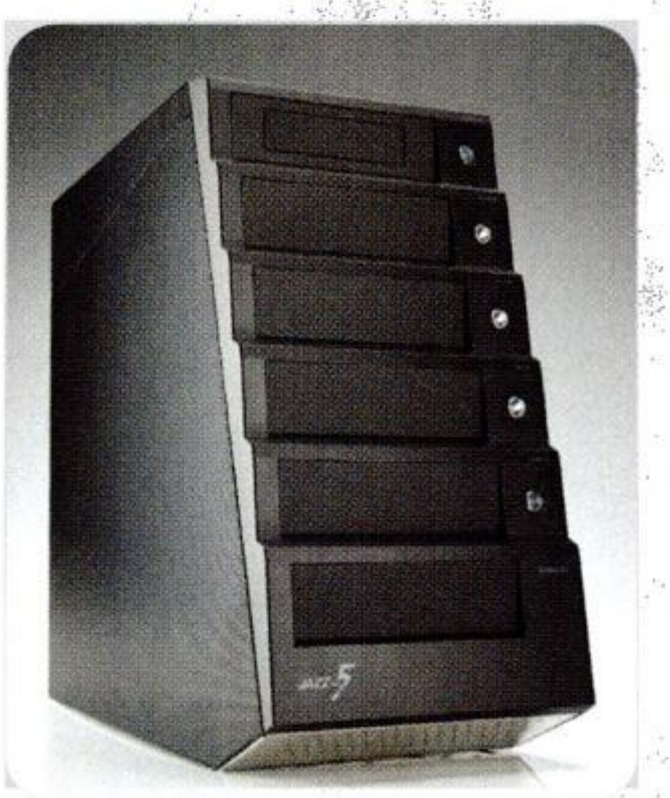
The downfall to all this ATX real estate is that this baby weighs a ton, and we're disappointed by the steel construction. Its full-size stature and weight limit the case to stay-at-home duty, but we can't think of too many better cases for the job.

MAXIMUM PC VERDICT: 9

+ FU MANCHU: Beautiful, sturdy, clever design, and tons of great features.

− MANDARIN: Aluminum would have been better than steel frame.

$180, www.silverstonetek.com



Windy Jazz Take 5

This case is imported from Japan and boasts a super-lightweight design thanks to its aluminum mesh construction. The mesh material also enhances airflow by allowing cool breezes to float in from any angle. The most notable design element, however, is its unusual stepped front bezel, which is comprised of six 5.25-inch drive bays. Unfortunately, none of the steps has a front I/O port.

The Take 5 is well-constructed, but not incredibly sturdy—the mesh walls don't feel nearly as resistant to bumps and scratches as other solid metal or aluminum enclosures.

The case is a snap to work on and in, with a slide-out motherboard tray and two removable drive cages that hold two drives apiece. The slanted step design makes things a bit cramped near the top of the case, but it's not a major issue. Cooling options are barely adequate though, with a 120mm fan above the AGP slot and a 60mm fan in the bottom of the front bezel. Several additional cooling kits are available, but considering this case already costs $400, they should be included. The outrageously high price tag can be partly attributed to the 500W PSU. A non-PSU version is available for $300.

MAXIMUM PC VERDICT: 7

+ GUNDAM: Super-light with lots of nice features.

− SPEED RACER: Way too pricey, no front I/O ports, and extra fans shouldn't cost more.

$400, www.soldam.com

Xoxide UFO

This unusual case is part Borg, part Battlebot, and part Hellraiser all rolled into one 18-inch cube. Easily the size of two mid-towers placed side-by-side, the UFO is a three-windowed beast that consumes more than 3.3 cubic feet. The model we received was fully equipped, with no less than seven cold-cathode lights and almost a dozen fans. It also includes five 5.25-inch bays and room for nine hard drives. The sheer terror this case evokes doesn't come cheap, however; the bare-bones version of the case costs more than $300, and the fully loaded version is twice that amount.

Unfortunately, the case's coolness factor diminished as we worked with it. Instead of individual panels, the case is built out of two three-sided sections. These oversized sections are difficult to work with because the top section must be lifted out and the fan connectors unplugged. With so many fans and lights, the case's interior is a massive tangle of wires before you even install your first PC component. Worse yet, for all the case's bells and whistles, it's missing a front I/O port!

The UFO is huge, pretty, creatively built, and certainly unique. Unfortunately, its awkward design will turn off all but the most hardcore case modders.

MAXIMUM PC VERDICT: 6

+ GALACTUS: One of the most creative prefab cases we've ever seen.

− DR. DOOM: Awkward to work with, pricey, and rat's nest wiring.

$600 ($300 for bare version), www.xoxide.com

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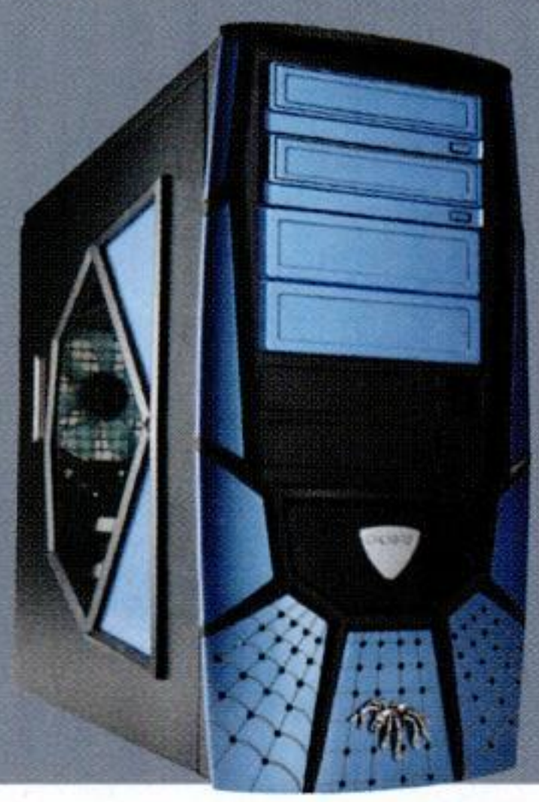
OUR FAVORITES

We pick the best case to represent each price category

BUDGET

Chenbro Xpider II

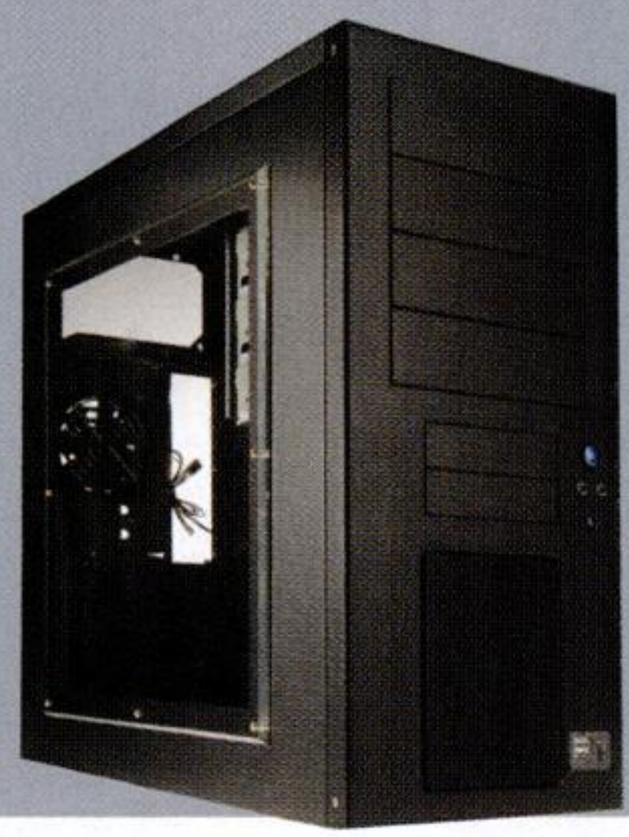
Chenbro is quickly becoming the king of budget cases by milling enclosures that are as sturdy as they are inexpensive. Its blue shell might not be photogenic, but it's built extremely well, with features usually found on cases that cost twice as much. As Chenbro's newest budget case, the Xpider II has improved on every aspect of the already excellent Gaming Bomb.



MIDRANGE

Kingwin KT-424

Kingwin's entry into our case roundup doesn't boast flashing lights and spinning vortexes, but its well-designed, roomy interior more than makes up for its conservative looks. Call us old-school, but we think this case's classic aesthetic allows it to fit in almost any environment.



HIGH END

Cooler Master CMStacker

The CMStacker is one of the best towers on the market, with great ventilation and an insane amount of expandability. To wit: If seven 5.25-inch devices aren't enough, you can swap out the front fan and hard drive cage to crank the number of bays all the way to 11! Its aluminum construction makes it surprisingly light for its size, and its six front USB ports will satisfy the most device-hungry user.

COMPARISON CHART

MANUFACTURER	MODEL	5.25 BAYS	3.5 BAYS	FRONT PORTS	PRICE	MOTHERBOARD TRAY?	PSU?	MATERIAL	COLORS	VERDICT
Antec	P160	4	6	2 USB, FireWire, audio	$170	Yes	No	Aluminum	Silver	8
Antec	Super LANBOY	3	6	2 USB, audio	$90	No	No	Aluminum	Silver	8
Chenbro	Xpider II	4	6	2 USB, FireWire, audio	$55	No	No	Steel	Red, blue, white, green	9
ClearPC	Secret Agent Briefcase	2	2	None	$150	No	No	Acrylic	Clear	7
Cooler Master	Cavalier 1	5	5	2 USB, FireWire, audio	$125	No	No	Aluminum	Silver	9 KICK ASS
Cooler Master	CMStacker	7	4	6 USB, FireWire, audio	$170	No	No	Aluminum	Silver/black	9 KICK ASS
Kingwin	KT-424	4	6	2 USB, FireWire	$100	Yes	No	Aluminum	Silver, black	9 KICK ASS
Silverstone	Temjin TJ05	6	10	4 USB, FireWire, audio	$180	No	No	Steel	Silver	9
Thermaltake	Damier	5	5	2 USB, FireWire, audio	$170	No	No	Aluminum	Silver, black, blue	9 KICK ASS
Windy	Jazz Take 5	6	4	None	$400	Yes	Yes	Aluminum mesh	Black	7
Xoxide	UFO	5	9	None	$600	Yes	Yes	Aluminum	Silver, black	6
Xoxide	X-Blade Extreme	5	6	2 USB, audio	$70	No	No	Steel	Silver, black, blue	8

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Motherboard for AMD Socket 754 CPU
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Ask the Doctor

Symptom ▶ Diagnosis ▶ Cure

PUSHING ALL THE RIGHT BUTTONS

I have a Windows XP Pro-based machine with an AMD Athlon XP 1800+ processor, a GeForce 3 Ti 200 videocard, a Soyo Dragon Plus motherboard, and a 120GB Western Digital hard drive. For some reason, the power button doesn't work properly anymore. After shutting down, I have to turn off the surge protector for 30 minutes and then turn it back on for the power button to respond. If I don't do this, the power button doesn't respond at all. What is the problem? Do I have to replace the power supply or is it an issue with the case?

—DUY NGUYEN

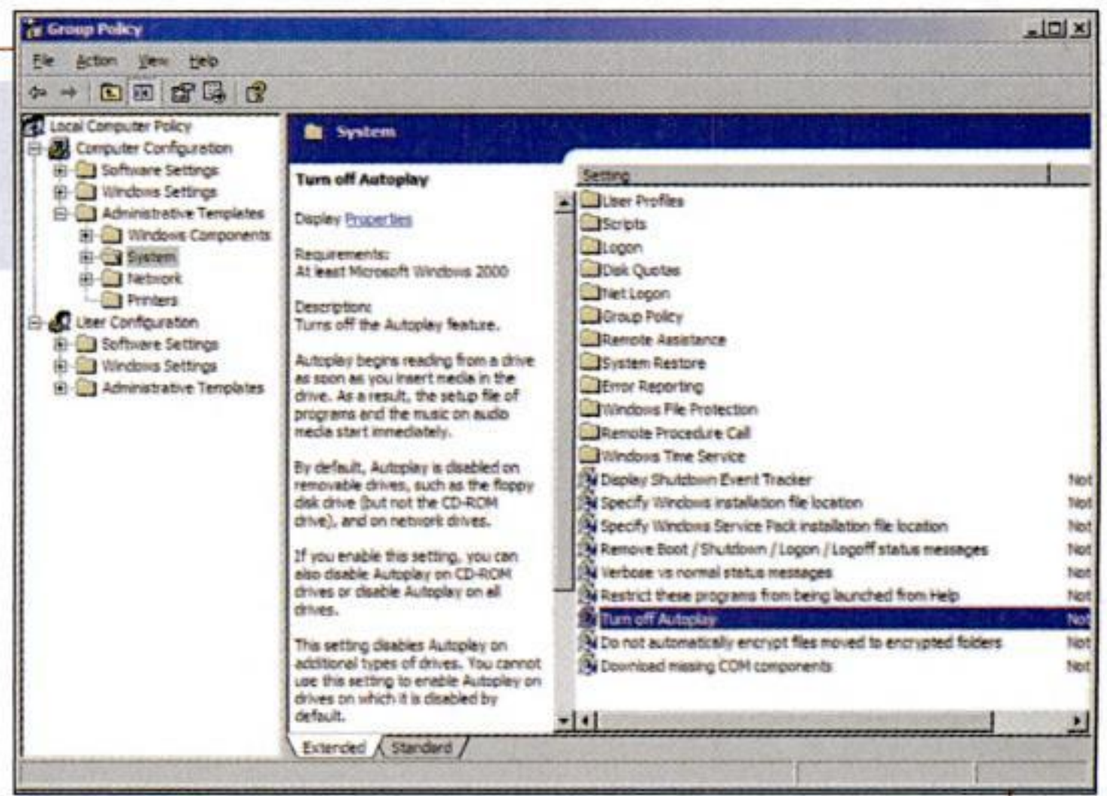
The Doctor has seen this on a few occasions and it's usually related to a conflict between a motherboard and the power supply. Sometimes simply swapping the power supply clears up the issue. While the Doc hasn't nailed down the cause, it may have something to do with the power supply's "power good" signal. Because ATX motherboards are equipped with their own power switch for operation, a nominal bit of juice flows to the board even when the PC is technically off. When the PC is turned on, the power supply waits from 100ms to 500ms for the voltage to stabilize and then sends a power good signal to the motherboard and the system boots. If the power good signal is not sent or is somehow interrupted, the system may not boot. Resetting the power supply by cutting the power and then turning it on somehow fixes this. So you likely have a bum power supply or one that is failing, or a motherboard that is failing. Swapping PSUs with your buddy may be the easiest and cheapest way to find out.

AUTOPLAY 'N' PRAY

Several months ago the Autoplay feature for my CD and DVD drives stopped working. I can still access the drives by opening them from My Computer but I miss the Autoplay feature. The strange thing is that I have Autoplay set for each drive's default settings but it still won't work. I've tried uninstalling and reinstalling the drives, doing several "System Restores" and visiting Microsoft's Knowledge Base with no results.

Do you have any ideas about what I should try next? Also, have I overlooked anything you can thank of? Thanks, Doc!

—MIKE POESCHL



If the normal ways to re-enable Autoplay don't work, you should check the setting in Group Policy Editor.

The Doctor has to hand it to you—you've done your due diligence. But as great a resource as the Knowledge Base is, the suggested "fix" for this problem isn't always effective, as you've discovered. Here's another solution. From the Start menu, select Run and enter GPEDIT.MSC in the dialog box. Click OK, and the Group Policy window will open. On the menu tree, expand Computer Configuration by clicking the plus sign, then do the same for Administrative Templates, and then System. Click on System, and then look in the right-hand pane. You'll see a selection called Turn Off Autoplay. Double-click it, and click the Enabled radio button. Close the window, restart your PC, and all should be well again.

TRIPPING OVER STREETS AND TRIPS

I have tried to fully load the complete MS *Works Suite 2004 Streets and Trips* program from the DVD I own but it only loads the operating portion of the program, meaning I must have the DVD in the drive when I access it. The *Encarta* program on the same DVD gave me a choice during installation so I could load the complete program but *Streets and Trips* gave me no option. How can I get the whole program loaded so I don't have to carry the DVD with me when I travel?

—RICK GOLDTHWAITE

Yet more proof that some guys will do anything to keep from having to ask for directions. Luckily, what you want is easy to accomplish. First, you'll need a CD burning application that will allow you to make disc images, which are virtual copies of your CDs and DVDs that exist on your hard drive. Almost all commercial burning applications allow this through "Copy Disc" or "Make Disc Image" selections. In essence, you'll be copying the contents of the disc not to another disc, but to a single file instead.

First, you'll have to uninstall the software that requires the DVD (you'll see why later). Insert the DVD into your laptop's optical drive. In *Nero 6*, go to Recorder > Make Image file.

In *Easy CD Creator 6*, select Copy DVD from the main menu. The Roxio Disc Copier will pop up. Click the Advanced button to get the options you'll need. Select your optical drive as the Source. Under Destination, click the Disc Image radio button. Then click Save As and indicate where you want the disc image to be saved. Save the file as an ISO image with a descriptive name (and make sure you've got enough space on your hard drive to accommodate the disc's contents). Click OK, and a disc image will be created; depending on the speed of your hard drive and the size of the DVD, this could take a long time. When the process is finished, you'll have a large file with the ISO extension.

Now go to www.daemon-tools.com and download the latest version of the free *Daemon Tools* utility. If the server's down, just do a Google search and you'll find many sites hosting this wonderful little app. Install *Daemon Tools* and restart your PC. In your system tray you'll see an icon with a red lightning bolt—that's the *Daemon Tools* virtual drive utility. Right-click it, select Virtual CD/DVD-ROM, click the drive letter that represents your optical drive, select Mount Image, and point *Daemon Tools* to your newly-created ISO file.

***Daemon Tools* creates a virtual optical drive on your PC that's essentially indistinguishable from a normal one. So you'll have to reinstall your application from this new virtual drive. Once you do, you'll have a portable copy of your software for travel.**

There's an unpleasant side effect, however. *Daemon Tools* is often employed by software pirates, so many recent games will refuse to launch if you have this utility installed—even if it's not in use. There's no work-around for this, so you'll have to uninstall and reinstall the utility if your games don't want to make nice.

THE RELUCTANT BURNER

I have a Hi-Val 32/10/40 CD-

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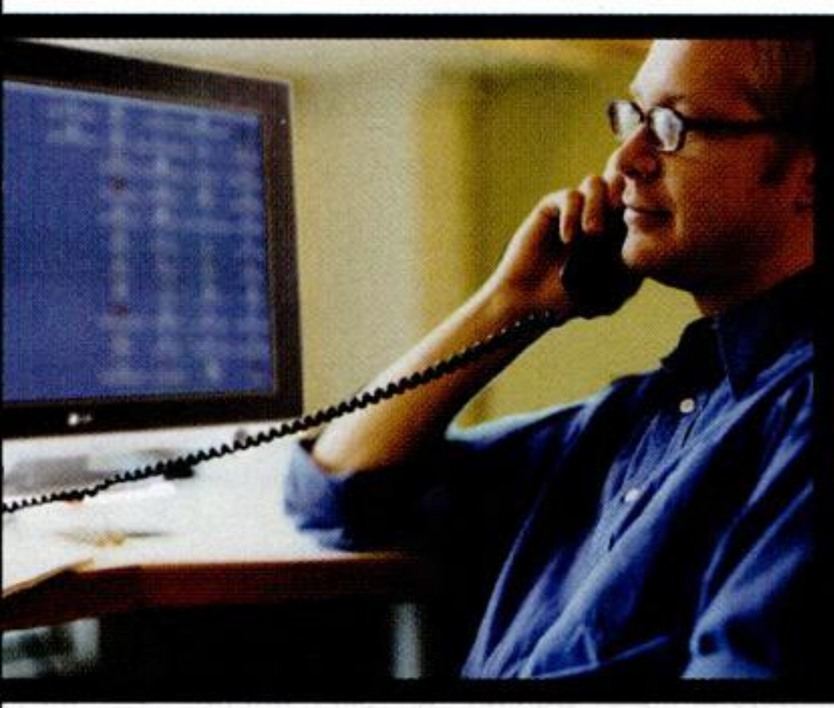

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RW drive that I'm experiencing some problems with. In the beginning the drive worked great and would have no problem burning CDs. Recently, it stopped working properly. I have used *Nero, Stomp DLA, RealPlayer* and even Windows XP's built-in burning application to no avail. Nothing seems to get my CDs to burn. Any application will burn to 99 percent and then error out, saying it can't complete the CD and to try burning with another one. I have used a dozen different brands of CD-Rs and CD-RWs and still no success. Is the drive dead, Doctor, or is there something I can do to get it working again?

—JOSHUA

This doesn't look good. The Doctor suspects that your burner is writing to the disc just fine, but for some reason it's not able to complete the lead-out process, which simply indicates the end of a disc's contents. Unfortunately, the lead-out must be present for the disc to work reliably. You've tried burning apps and different CD brands, and presumably you aren't attempting to "overburn" discs, so the Doctor recommends updating the drive's firmware (available at the manufacturer's web site). If this doesn't help, try testing a friend's optical drive in your PC. The Doctor's guess is that it will work fine, indicating that your drive has given up the ghost.

GEE, DAD, I DIDN'T MEAN TO...

My well-meaning son accidentally set a password on my Windows 2000 machine and now I can't log in to my computer. Is there any way I can get around this problem or do I need to reinstall Windows?

—PAWEL

The solution to your problems is a handy piece of software called *ERD Commander* (www.winternals.com). It will create a boot disk that lets you make changes to a Windows XP or 2000 system, even if you don't know the password. It's a little pricey at $150, so you may end up simply reinstalling anyway.

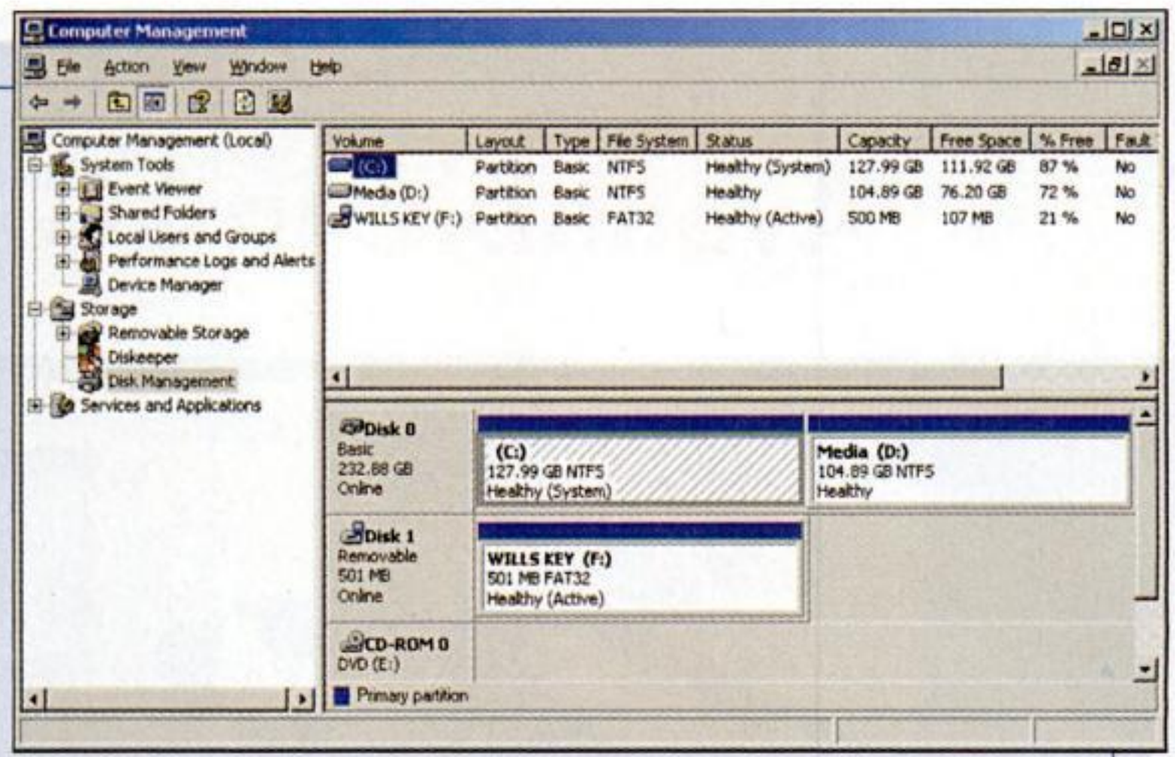
PARDON MY PARTITION

I'm installing Windows on a new computer, but I can't format a partition bigger than 137GB. What's up with that?

—MATT YOUNGBLUT

This is a problem with pre-SP1 versions of Windows that are unable to address more than 137.4GB of a hard drive. We ran into this problem in the old days at 504MB, then at 8.4GB, and once again at 137GB. This barrier results from the original design specification for the ATA interface, which allotted a measly 28 bits for addressing a device. Because devices are "addressed" by their number of sectors, this 28-bit limit means that only a small number of sectors can ever be seen using a 28-bit number. The exact limit is 268,435,456 sectors of 512 bytes, which equals 137.4GB, to be exact. All newer drives now use 48-bit logical block addressing (LBA), which will allow hard dives to be addressed until they reach the ungodly capacity of 144 million gigabytes (144 petabytes), but that won't happen for *at least* a few years.

So, how to fix this? The easiest way is to install the latest Service Pack for your OS. Also, drives that run off a PCI ATA add-in card don't have to deal with this barrier because they are using PCI drivers from your motherboard's chipset. Most drive manufacturers also offer free utilities that will enable 48-bit LBA addressing as well.



If you're installing Windows on a hard drive with greater than 137GB capacity, you need to either install a copy of Windows with Service Pack 1 or add a second partition after you installed SP1.

CAN DRIVER UPDATES INCREASE POWER CONSUMPTION?

Thanks for the great article on power supplies in your June issue. I was experiencing random lockups and had just about given up until I read that article; now I plan on upgrading to a better power supply. I did have one question, though: Is it possible to push an already overtaxed power supply over the edge by updating the drivers for a videocard? It may be coincidence, but I started having issues with my system right after a driver upgrade for my GeForce 4 Ti 4200. Could a driver update increase the need for wattage?

—KELLY MARTIN

Theoretically a driver update could increase the demand on your power supply, but we've never seen it happen. It's more likely your driver update didn't sit well with the other hardware in your system. We'd recommend updating the drivers for your motherboard chipset before you go out and buy a new power supply.

DELETING THE UNDELETABLE

I have a folder on my system that can not be deleted. Every time I try to delete it, this error message comes up: "Error deleting file or folder. Cannot delete folder: The directory name is invalid." I can rename the folder and cut and paste it to different locations but I can't open it or delete it. I think this folder used to contain digital pictures. However, Windows shows the folder to be empty and 0KB in size. How can I get rid of it?

—ROGER T. CHUNG

This problem is usually caused when a file folder has a character in the name that Windows doesn't understand. You can usually delete the file by using the command line. Open the command line by going to the Start menu, clicking Run, and typing cmd. Copy the folder to C:/temp/ using the graphical interface, then type `cd \temp` to browse to the temp folder. Type `dir` and look for the folder you're trying to delete. Make a note of the folder name. To get rid of it, type `rd "folder name"` (with quotation marks around the name of the folder).

POWER ISSUES

I built a small formfactor system with a 2.4GHz Pentium 4, an 845 chipset, an ATI Radeon 8500 videocard, and a 120GB Maxtor hard drive. I want to upgrade to the ATI X800 XT Platinum Edition. I'm a little concerned about the power, though. Is this too much hardware for my little Shuttle?

—JIM SELTZER

It really depends on which vintage Shuttle you have. Certain older systems feature just 200 watt power supplies. This could be insufficient for a high-performance videocard. The good news is that the X800 XT Platinum Edition isn't a big power hog. If your system can support a Radeon 9800 XT, for example, it should run the X800. You might also consider the 250-watt power supply upgrade that Shuttle sells. Furthermore, the X800 XT needs a big fat CPU, so you should consider upgrading that component. The Doc has found that 3.2GHz Pentium 4s running on an 800MHz bus aren't enough to keep the X800 happy, so get as big a CPU as your box can accommodate. The 845 chipset doesn't support CPUs above 3.06GHz. ■

I said, Doctor, is there nothing I can take, to relieve this computer-ache? Fear not, gentle reader, there's no need to mix a lime and a coconut, just e-mail **doctor@maximumpc.com** and tell the Doctor about all of your computer's ills.

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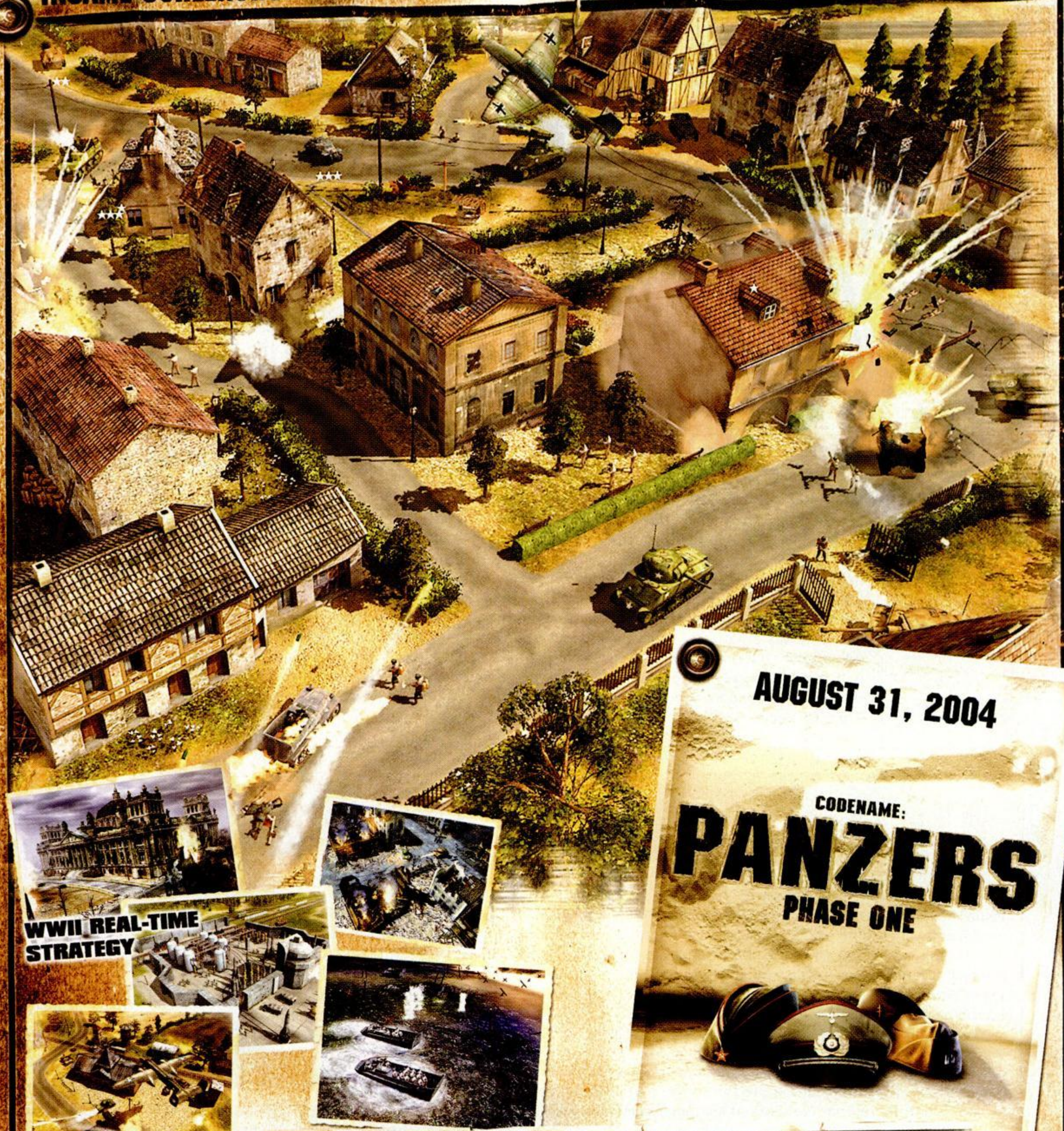
INGAME SCREENSHOT



WWII experiences its rebirth in 2004 with the appearance of the colossal game Codename: Panzers. Breathtaking graphics, fantastic mission design, a complete immersion in the events via amazing scenarios and intense multiplayer modes. Like never before Codename: Panzers will give you the feeling of being at the landing at Omaha Beach, the defense of Stalingrad, the conquering of Berlin or the battle in the Ardennes.

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How To... A step-by-step guide to tweaking your PC Experience

PROGRAM A GUI

MAXIMUM PC
TIME TO COMPLETION
3:00
HOURS MINUTES

In part two of our Visual Basic programming how-to, we show you how to add a GUI to the basic cryptography app we wrote in May

BY BRYANT BRABSON

Tell us what you think! This is the second in a series of four Visual Basic programming how-tos. Next, we'll show you how to encrypt text files using our application. In the meantime, we welcome your thoughts on this article! Send your opinions, or any ideas for future How-Tos to **howto@maximumpc.com.**

Our inaugural programming How-To, "Learn Visual Basic Programming" (**www.maximumpc.com/how_to/reprint_2004-04-07.html**), appeared in May 2004 and showed you the basics of creating your very own command-line Visual Basic.NET application. But command-line apps aren't always convenient or practical. You paid damn good money for the eye candy that is Windows XP—why waste that by running your app from a black and white command-prompt window when you can fire it up with a mouse click? Read on and we'll show you how to develop a GUI app using *Visual Studio.NET's* Windows Form Designer.

Remember that a GUI—a graphical user interface—is a visual representation of a computer program. Virtually every program you use on your computer sports a GUI. Instead of typing long, unwieldy commands, you interact with the program via objects like buttons, text boxes, icons, and menus, which you manipulate using a device such as a mouse, keyboard, or touch screen.

This month, we'll leverage the work we did in part one with the command-line interface for cryptography, and create a GUI-based app that functions the same as our last version.

1 Get your tools

All you need to write Visual Basic code is a copy of Microsoft's *Visual Basic .NET 2003.* You can either order a 60-day trial DVD or try the software online using your broadband Internet connection. Information explaining how to do both can be found at **http://msdn.microsoft.com/vstudio/productinfo/trial/**. If you already have a copy of *Visual Studio.NET, Visual Basic.NET* is included as part of the *Visual Studio* package.

We also like to keep Michael Halvorson's book *Microsoft Visual Basic.NET Step by Step* handy. It's a great beginner's guide to programming in VB, and can answer all your Visual Basic syntax questions. One more thing: You should bookmark the Microsoft Developer Network at **http://msdn.microsoft.com/**—it's a great reference.

It's absolutely vital that you open the source code for this application so you can look at it while you read this how-to! In the article, we'll explain high-level concepts, outline good programming practices, and explain how certain code snippets work, but we also have detailed explanations of Visual Basic syntax and a play-by-play description of how each line of code works in the comments of the source files for the program. The complete Visual Basic project file and code are available in the Extras section of our CD-ROM, or at **www.maximumpc.com.**

2 Create your project

Before we can write our first line of code, we need to start *Visual Studio 2003's* integrated development environment (IDE). Create a new project by first clicking File, then New, and finally Project. Don't be overwhelmed by the number of options on the screen. Just make sure you select Visual Basic Projects on the left under Project Types, and that you select

DEFINING TERMS

IDE: Integrated development environment. An IDE is an application that combines developments tools such as code editors, GUI builders, compilers, and debuggers into a single programming environment. IDEs contain everything you need to write a program.

WYSIWYG: What you see is what you get. In a programming context, WYSIWYG means that what you see in the IDE when you're coding your app is the same thing you'll see when you run it.

FORM: When building .NET applications, a form is an application's user interface.

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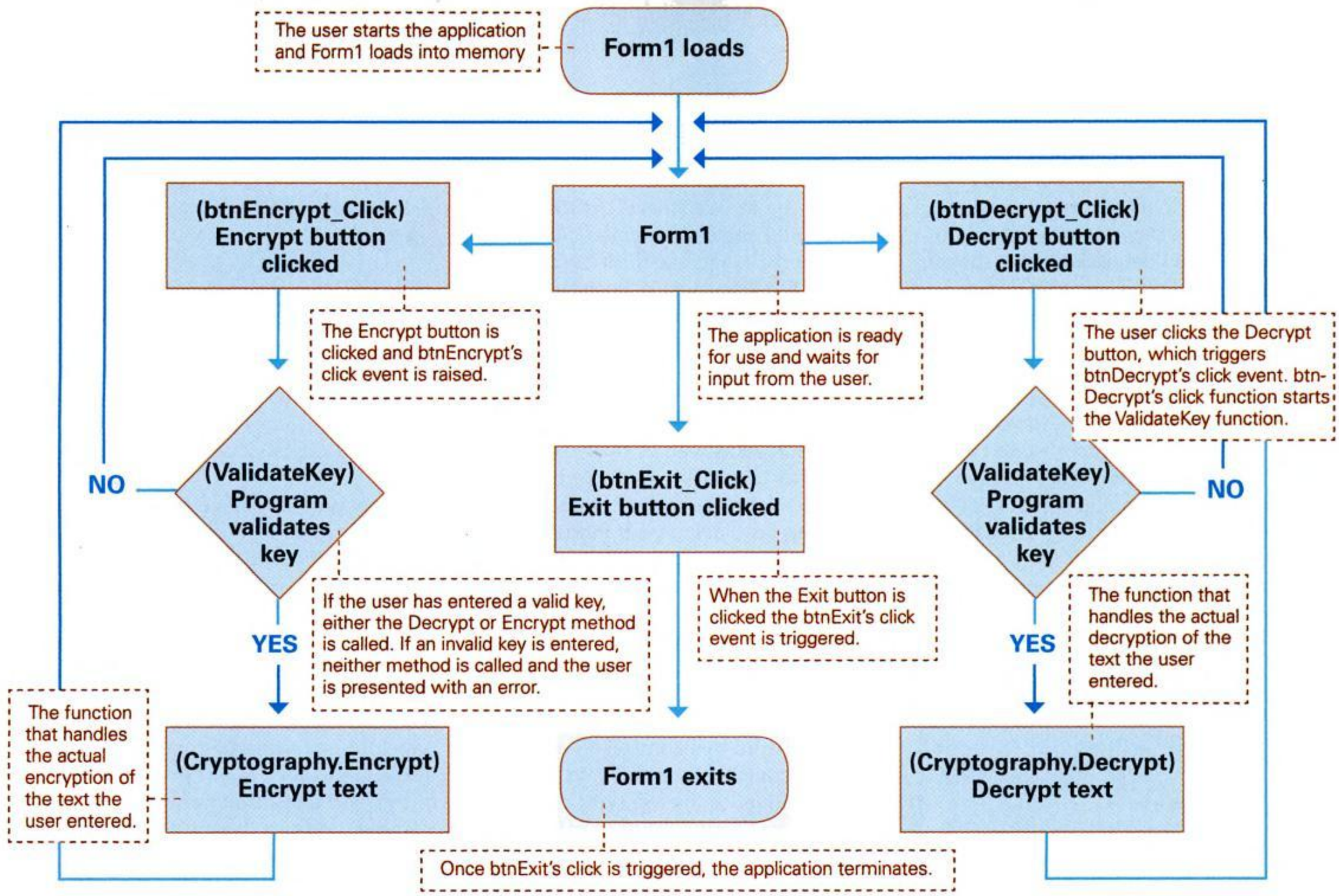
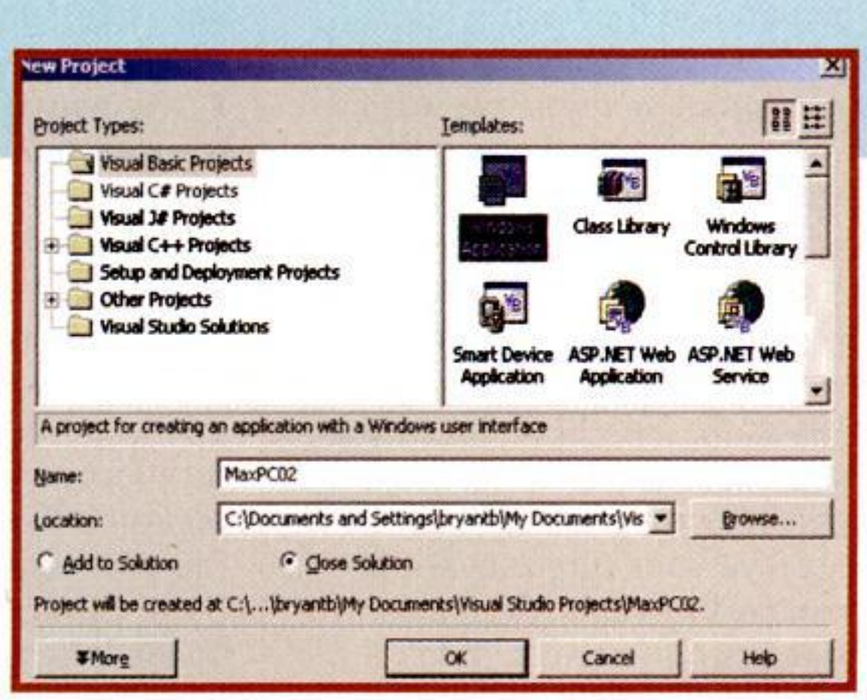
Stepping through a GUI

From the time your program's first form loads to the time it exits, this chart shows you every function

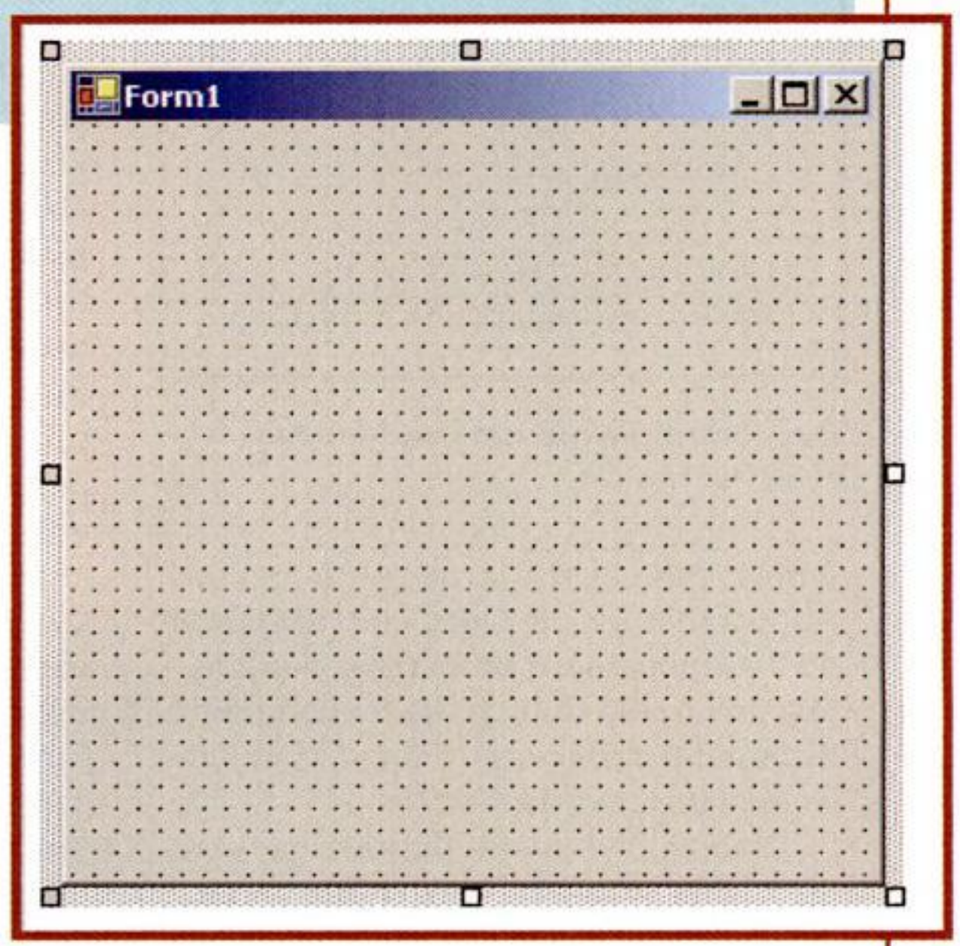


Windows Application on the right of the dialog box under the Templates label. For simplicity's sake, we'll call our program "MaxPC02." Once you click the OK button, *VS2003* will create a new directory in the My Documents\Visual Studio Projects folder. This directory will have the same name as your project and will contain all the files that make up your application.



The journey of a thousand miles begins with the creation of a new VB.NET project.

The IDE has now entered the WYSIWYG design view mode, and a blank Windows Form named Form1 has been created. Look at the Solution Explorer and you'll see that the file representation of Form1, named Form1.vb, has been created as well. Form1 is our GUI for this project, and will be the canvas on which we create our programming masterpiece. Form1 is a lousy moniker for a work of art, though, so let's change it. In the process, you'll learn more about the Visual Studio IDE as well as Windows Forms.



The newly born Windows Form, future home of our GUI. Simple. Unassuming. Gray. Very gray.

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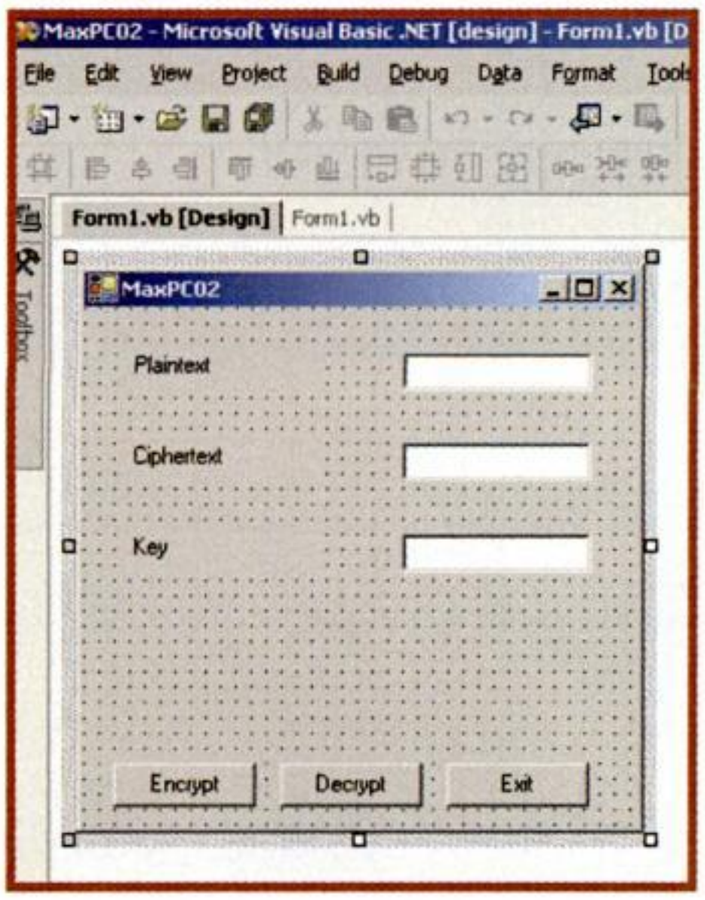
3 Create your app's graphical framework

CREATING A FORM

Now it's time to get down to the nitty gritty of building your GUI. Select Form1 by single-clicking it. If you double-click the form, you'll enter code view mode, and we're not ready for that yet. If you accidentally double-clicked, click the tab named "Form1.vb [Design]" (found at the top of the design area) and you'll return to design view.

In the bottom right corner of the IDE, under the Solution Explorer you should see the Properties window. (If you don't see the Properties window, press F4.) The Properties window displays the various properties of the object selected in the Windows Form Designer. In the Properties window, under the Object Name combo box, are a couple buttons that toggle the sorting of the properties. If Categorized isn't selected, select it now, and use the scroll bar to find the Appearance group. Once you have located the Appearance properties, click the text box to the right of the Text property. It should currently say "Form1" but let's change that to "MaxPC02."

Once you've made the change, you can either press Enter or move your cursor out of the Text property textbox. If you look over at your form, you'll see that the text at the top now reads "MaxPC02" instead of Form1. You can manipulate numerous other properties in the Properties window.



The control layout we used for this project.

ADD BASIC ELEMENTS TO YOUR FORM

OK, so now let's use this form upon which we've lavished so much attention. Look to the far left side of the IDE and you should see a tab labeled "Toolbox." If you don't see it, use the View menu or Ctrl+Alt+X to open it. Position your cursor over the Toolbox tab and it should slide into view. You'll see a list of controls commonly used on Windows Forms. If you right-click the toolbox, you can change the way the controls are displayed as well as their sort order. We prefer "List View" and "Sort Items Alphabetically." As long as the toolbox has focus by placing your mouse cursor over the toolbox tab, it will remain in view. If it loses focus, it will slide out of the way, giving you more room to work. Let's add a TextBox control to the form so that we have a way to input data to be encrypted. There are several ways to add controls to forms, but let's drag and drop this control. Find the TextBox control in the toolbox, left-click it, drag it over to the top right quadrant of the Form1 form, and then release your mouse button. If you prematurely released the mouse button, single-click the textbox, which *Visual Studio* has named TextBox1, and then drag it to the proper location on the form.

TextBox1 is not exactly the type of effective, descriptive name we want for controls in our code. Let's use the Properties window to fix that. Find the Name property in the Design group and change it to "txtPlaintext." We're using the prefix "txt" so we'll know we're dealing with a TextBox object when we look at raw code. Get rid of the default text by erasing "TextBox1" from the Text property. While you have txtPlaintext selected, move your cursor over the control's edges. You can resize a control by dragging its boundaries. To tell the user the purpose of txtPlaintext, drag a Label control from the toolbox to the form and position it next to txtPlaintext. Then change its Text property to "Plaintext." If we were going to programmatically access this label we would give it a better name, but we're not, so we won't.

MAKE A PLACE FOR YOUR DATA

Now we have a way to get unencrypted data into the application, but how do we receive the encrypted data? Let's use a second textbox to handle this issue. Add another TextBox to Form1, and set its name to "txtCiphertext." Then delete the default text from the Text property. Also, add a label beside txtCiphertext and set its Text property to "Ciphertext." Because we also need a way to input a key with which to encrypt and decrypt data, add a Label with a Text property of "Key" and a TextBox named txtKey. Remove txtKey's default text so that the user will see a blank TextBox at runtime. For the cryptography algorithm we used in our original app, the maximum acceptable value for the key is 94, which is a two-digit number. By setting the MaxLength property to 2, we instruct our program to validate the user's input by restricting the number of characters that he can type into txtKey.

We need a way to start the process in which data from txtPlaintext will be encrypted and then placed in txtCiphertext. An obvious candidate for this position is a button, which can be found in the toolbox and added to the form in the same manner as the other controls that we've worked with so far. In fact, add three buttons and position them along the bottom of the form. Name the buttons "btnEncrypt," "btnDecrypt," and "btnExit." Set their text properties to "Encrypt," "Decrypt," and "Exit," respectively. Refer to the screenshot on the left if you have any problems arranging the controls.

Now you have a nice Windows Form with several controls. However, the Form is just an empty shell, until we write code that tells the app what to do when each button is pressed.

DEFINING TERMS

CONTROLS: Objects such as TextBoxes and Buttons that comprise the user interface.

TEXTBOX: A control that accepts user text input.

LABEL: A control that provides descriptive or informative text to a user.

BUTTON: A control that can be clicked in order to cause an action.

VALIDATE: The examination of data to insure it meets predefined criteria.

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4 Tie the new GUI to the program

The GUI is designed, so let's get down to coding. Because this How-To is an introduction to Windows Forms programming, we're going to show you the fastest, easiest way to write code to handle Form1's button clicks.

In this project we're going to reuse the Cryptography class from the previous programming How-To (if you don't have that code, you can download it from **www.maximumpc.com/images/programming_files.zip**). Code reuse is one of the nice features of object-oriented programming (OOP), which was covered in the previous programming How-To. We need to import the Cryptography class file (Cryptography.vb) from the MaxPC01 project into our new MaxPC02 project.

To do so, right-click the project file MaxPC02 in Solution Explorer and then select Add, Add Existing Item from the context menu. Use the dialog box to navigate to the folder where you have saved the MaxPC01 project and then select the Cryptography.vb file. The file will appear in Solution Explorer under the MaxPC02 project and will also be copied to the MaxPC02 directory.

Let's start off with something easy. Double-click btnExit. This will take you to the code view of Form1 and your cursor should be positioned inside a special type of method, an event handler named "btnExit_Click." Clicking the Exit button causes or "raises" the Click event, and the code in this method "handles" the Click event for btnExit. As the name suggests, clicking btnExit will allow us to halt execution of our application. A really simple way to achieve this goal is by using "Application.Exit()," so that's the only code needed for this event handler. Note that because there's nothing in the parenthesis, we're not giving the Application.Exit function any variables. Luckily, Application.Exit doesn't require variables, whenever it's called, the app simple closes.

Now that your application actually has some functionality, you can test it if you'd like. From within the IDE, click the "Start" button, which is located in the top menu area. *Visual Studio* will build and, if there are no errors, run MaxPC02 for you. Once you're finished gawking at the form, press the Exit button and get back to work!

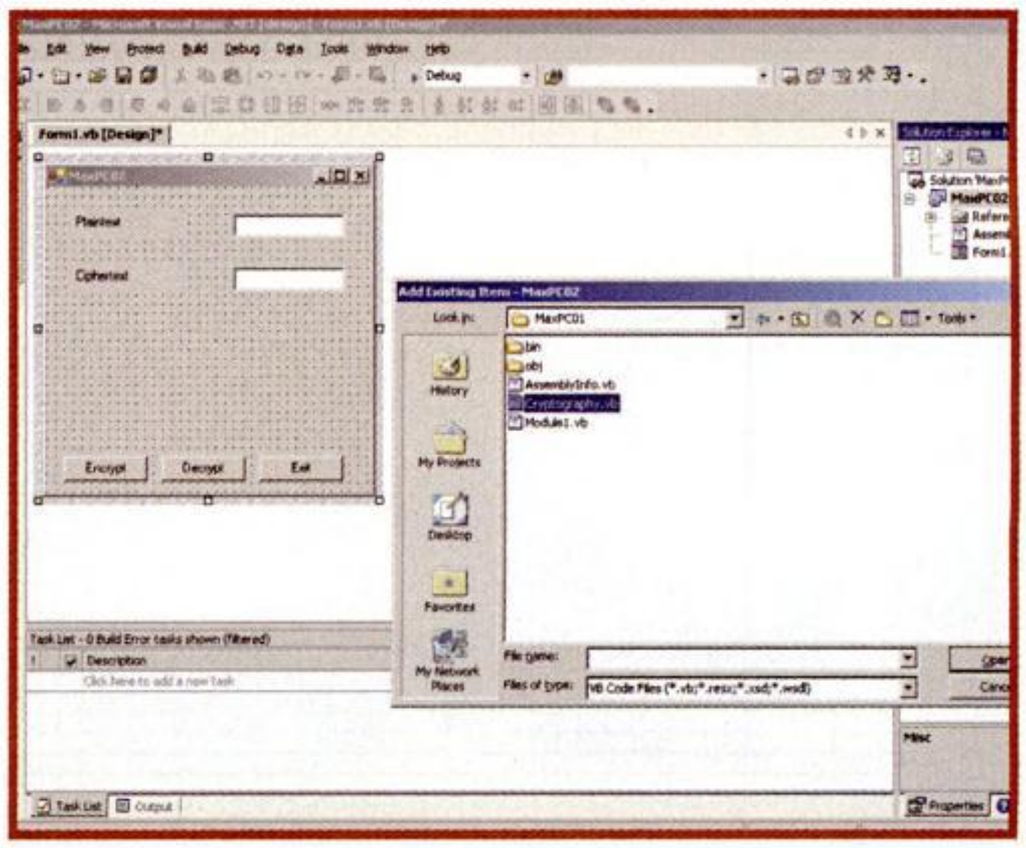
DEFINING TERMS

EVENT: A notification or signal that is generated by a user action, such as a button click or a key press. Events can also be raised by internal application activities, such as saving a file or an incoming IM.

CODE VIEW: An editable view of the code that makes the Windows Form work.

EVENT HANDLER: A method that is invoked because of an event.

METHOD: The procedures associated with an object.



Visual Basic **makes it easy to reuse old code. All you have to do is browse to the location of the previous programming How-To and add the cryptography.vb file to your new project.**

5 Encrypt, decrypt, rinse, repeat

Now, let's look at how the encryption function actually works. Double-click btnEncrypt, which tells *Visual Studio* to generate the skeleton of the btnEncrypt_Click event handler. Turn your eyes to the sample code on the next page, and we'll step through the code and explain what the function actually does.

The first thing the program checks is whether the user has entered any plaintext by using the methods and properties of the TextBox class. If you didn't catch on earlier, the controls that you added to your form weren't static, immutable widgets but dynamic class members that are instantiated when you run your program. For example, txtPlaintext is a member of the TextBox class and has a property named Text. Not only can we set the value of this property at design time, we can also get the value of this property when the program is run. This means that

DEFINING TERMS

RUNTIME: Runtime is the moment when a program is loaded into computer memory.

MESSAGEBOX: A MessageBox in .NET is a small form used to alert or inform the user using text, icons, or sound.

INTELLISENSE: IntelliSense is a feature of Microsoft's *Visual Studio* that displays information as you type in the code editor. IntelliSense can supply syntax information as well as complete words and help you beautify code.

CLASS: A named entity composed of related data and the methods that act on that data. A class is to an object what a blueprint is to a house.

OBJECT: An instance or occurrence of a class that has been created during program execution. Think of a cookie cutter as the class and the cookies as the objects.

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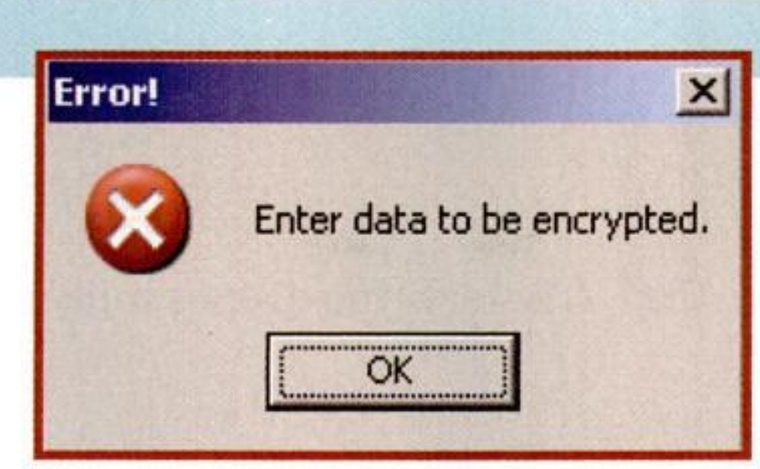
5 (continued)

the txtPlaintext control is a box the user can type text into when he or she runs the program. We can use one of the TextBox class' methods, Trim(), to remove the leading and trailing spaces from the Text property. Then we use the Length property to figure out the length of the text the user entered. If after trimming the blank spaces from the sides of the data in the txtPlaintext control, the length is zero, then we know the user hasn't typed anything into txtPlaintext at all and there's nothing to encrypt!

If this happens, we notify the user that there's a problem using the MessageBox class, which displays a popup message. Look for the line that begins "MessageBox.Show("Enter data to be encrypted"). This line of code is the Show method of the MessageBox class in action. Here's how it breaks down: "Enter data to be encrypted" is the error message displayed, "Error" is the title of the popup window that will be displayed, MessageBoxButtons. OK is a constant that specifies that only an OK button will be displayed, and MessageBoxIcon.Error is the icon that will be shown. *Visual Studio's* IntelliSense feature will show you the syntax of the Show method as you type the code.



The MessageBox provides the means to notify users of important events.

If the user did enter some text, control passes into the "txtPlaintext. Text.Trim().Length > 0" If statement. Once there, the line of code containing "If ValidateKey(txtKey.Text.Trim())" is evaluated. If ValidateKey is false, then we're going to inform the user that the data is invalid using another MessageBox. However, if the value returned from the ValidateKey function is true, then we'll proceed with encrypting the data that the user entered into the txtPlaintext textbox.

To kick off the encryption process we'll instantiate an instance of the Cryptography class—in simple terms, we'll tell the program to begin encrypting the text in txtPlaintext—using the code

"Dim Crypto As New Cryptography"

and then set the Crypto object's key property with the code

"Crypto.Key = CInt(txtKey.Text.Trim())."

Notice that there is a call to a VB.NET function named CInt. This data type conversion function transforms input to an integer value. We must do this because the Text property of the txtKey TextBox returns a string but the encryption key must be an integer. If you tried to set the Key property to txtKey.Text's value, you'd get an error when you tried to compile your program.

Now that the encryption key is set, we're ready to encrypt something. Using the value of txtPlaintext.Text as a parameter, we call Crypto's Encrypt method and then assign the value returned from that call to the txtCiphertext textbox. The encoded text can then be viewed in txtCiphertext. Tidy up the form with a call to txtPlaintext. Clear(), which removes the unencrypted text from the Plaintext textbox. We're going to leave the text property of txtKey unchanged so the user can just click the Decrypt button and check that the just-generated ciphertext is valid. The validity of the ciphertext is confirmed if the data in txtCiphertext, when decrypted, is the same data that was originally input.

The implementation of the btnDecrypt_Click event handler is similar to the btnEncrypt_Click handler. Both functions work the same way, but some names have been changed. In the btnDecrypt_Click code, txtCiphertext and txtPlaintext reverse functions; txtCiphertext provides input and txtPlaintext receives output rather than the other way around. The only other major change is a call to Crypto's Decrypt method rather than the Encrypt method.

SAMPLE CODE FROM FORM 1.VB

Here's the important snippet of code that makes your Encrypt button work. Step 5 explains the function, but if you want a line-by-line breakdown explaining what each line does, you should open Form1.vb and dig the comments.

```
 Private Sub btnEncrypt_Click(ByVal sender As System.Object,
ByVal e As System.EventArgs) Handles btnEncrypt.Click
    If txtPlaintext.Text.Trim().Length > 0 Then
      If ValidateKey(txtKey.Text.Trim()) Then
        Dim Crypto As New Cryptography

        Crypto.Key = CInt(txtKey.Text)
        txtCiphertext.Text = Crypto.Encrypt(txtPlaintext.Text.
Trim())
        txtPlaintext.Clear()
      Else
        MessageBox.Show("You have entered an invalid key.",
"Error!", MessageBoxButtons.OK, MessageBoxIcon.Error)
      End If
    Else
      MessageBox.Show("Enter data to be encrypted.", "Error!",
MessageBoxButtons.OK, MessageBoxIcon.Error)
    End If
  End Sub
```

6 You're done

We've really just scratched the surface of Windows Forms programming in this How-To. There's more going on behind the scenes than we've covered in this article, but you should now have the skills to explore further on your own. For example, poke around Form1 and figure out how to link btnExit to your Esc key.

Next time we'll show you how to use the .NET API to read text from files, encrypt it, and output it as an encrypted file. ■

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In the Lab

A behind-the-scenes look at Maximum PC testing

The Cost of Registered RAM

We test how much faster non-registered RAM runs

Registered RAM, like this Corsair Micro module, isn't necessary in the new Athlon 64 FX PCs. Old FX-51 CPUs required it, but new versions don't.

The debut of AMD's Socket 939 signals a rapid sunset on the older Socket 940 line. In a nutshell, Socket 939 and the Athlon 64 FX processors that use it eliminate the need to use registered RAM modules. Registered RAM uses the same basic SDRAM chips as today's DDR400 modules, but includes an additional controller chip that "redrives" the signals to the memory chips for more reliable communications. This reliability isn't free, of course. The cost of registered RAM is an additional clock cycle of latency.

Registered RAM is mostly used to increase reliability in servers and workstations, which are densely packed with multiple gigabytes of memory. Desktop machines, which aren't as prone to 24/7 operation or housing large amounts of RAM, usually don't need nor even work with registered RAM. But in creating the first Athlon FX for Socket 940 boards, AMD essentially changed the name of its workstation/server CPU from Opteron to Athlon 64 FX and carried over the registered RAM requirement.

To gauge the performance impact of migrating from registered RAM to normal RAM, we took our reference Socket 940 Asus SK8N motherboard and outfitted it with 1GB of registered RAM and an Athlon 64 FX-51. We ran this board in both single-channel mode and dual-channel mode with the same RAM. We then configured a Socket 939 Soyo CK8 motherboard with 1GB of DDR400 and an Athlon 64 3400+. Both boards use the nForce3 150 chipset, as well as the same hard drive, videocard, driver, and OS, making the test a fair measurement. While the design of the motherboard and BIOS could have a slight impact on our results, it's the fairest way to isolate the variable of different kinds of memory. And although it can't be directly compared, we also configured a machine using an Athlon 64 3400+ in an MSI K8N Neo board equipped with the newer nForce3 250Gb chipset. All the systems' CPUs were clocked at 2.2GHz.

Our Lab tests yielded interesting results. First the most obvious: Registered RAM could not have been removed from the Athlon 64 FX soon enough. It's clear that the extra latency has handcuffed the Athlon 64 FX line. The most direct comparison was between the SK8N/Socket 940 board running in single-channel mode and the CK8/Socket 754 in single-channel mode (Socket 754 CPUs do not support dual-channel modes). The registered RAM system trailed the non-registered RAM system by margins up to 4.1 percent.

Also of interest is how well the Athlon 64 FX-51 performed when running in dual mode—while it was faster than the non-registered system, it won by less than we expected. We saw about a 3.7 percent bump in *3DMark 2003's* CPU test and very slight increases elsewhere. Even more surprising, the dual-mode FX system and the single-channel system tied in *Quake III*. And weirder still, in *3DMark 2001 SE*, the FX ran behind the non-registered system. The only improvement we saw was a massive 84.5 percent bump in the synthetic *SiSoft Sandra* RAM test. This leads us to believe that either synthetic benchmarks aren't worth a damn or that there are very few applications that can actually use or are optimized for the boatloads of memory bandwidth the Athlon 64 FX provides.

CPU	Athlon 64 3400+	Athlon 64 FX-51	% Difference	Athlon 64 FX-51	% Difference	Athlon 64 3400+
Clock speed	2.2GHz	2.2GHz		2.2GHz		2.2GHz
Socket	754 pin	940 pin		940 pin		754 pin
Mainboard	Soyo CK8	Asus SK8N		Asus SK8N		MSI K8N Neo
Chipset	nForce3 150	nForce3 150		nForce3 150		nForce3 250Gb
RAM	1GB DDR400 single channel	1GB DDR400 registered single channel		1GB DDR400 registered dual channel		1GB DDR400 single channel
Quake III "Normal" Four	450	435	3.3	450	0	456
Sandra RAM Composite	3041	3034	0	5609	84.5	3005
3DMark 2001 SE	19990	19511	2.4	19820	-2.4	20095
AquaMark 3 CPU	9638	9243	4.1	9829	2	9665
3DMark 2003 CPU	757	729	3.7	780	3.7	757
UT2003 Fly By 6x4	309.3	305.1	1.3	312.3	.9	317.0
SYSmark 2004 Overall	173	169	2.3	174	.6	168

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TESTED & GEEK APPROVED

SanDisk's SD 256MB + Wi-Fi Card

Double-dogging your SD slot

Your sad little handheld, born in the halcyon days when 32MB was plenty of storage and "wireless connectivity" meant line-of-sight infrared, has some life in it yet. SanDisk's SD 256MB + Wi-Fi card is a brawny upgrade for any Pocket PC handheld with an SD slot. You get 256MB of additional storage (duh) and a Wi-Fi adapter with exceptional range in a package the size of a stick of chewing gum. Welcome back to the modern world! $130, www.sandisk.com

Best of the Best

As of September, 2004

After months of dominating our Best of the Best list, Compaq's famous iPaq has finally been bumped by a more worthy PDA: Dell's Axim X30. Dell's first PDAs weren't much to write home about, but the new X30 is one sexy beast, Ms. Moneypenny. Because of waning activity in the CD-RW category, we've eliminated it from our list. (CD-RW freaks should note that the Plextor Premium remains our favorite CD-RW-only drive.) In the videocard category, we're withholding judgment on PCI Express cards until we can see more of them. In other news, Maxtor's 300GB DiamondMax 10 and its 16MB cache bested Hitachi's 400GB drive, bumping it off the list. We also continue to withhold our opinion of Socket 939 motherboards until we're able to test more of them in the Lab. The same stands for LGA775 motherboards for Intel CPUs. Finally, it's official: NEC's FE2111 SB has banished all challengers in the CRT category. Next month we expect to begin listing a most favored nation status for headsets, so stay tuned.

High-end videocard: Leadtek WinFast A400 Ultra TDH

Budget videocard: ATI Radeon 9800

Do-everything videocard: All-in-Wonder Radeon 9800 Pro

Soundcard: Sound Blaster Audigy 2 ZS Platinum

Serial ATA hard drive: Western Digital 740GD Raptor

Parallel ATA hard drive: Maxtor DiamondMax 10

DVD burner: Sony DRU-700A

LCD monitor: Dell 2001FP

High-end CRT monitor: NEC FE2111 SB

Budget CRT monitor: Cornerstone P1750

P4 motherboard: Abit IC7-MAX3

Athlon XP motherboard: Asus A7N8X Deluxe Rev. 2.0

Portable MP3 player: Apple iPod 40GB

Photo printer: Canon i9900

Pocket PC PDA: Dell Axim X30

Palm OS PDA: Palm Tungsten C

7.1 speakers: Creative Labs Gigaworks S750

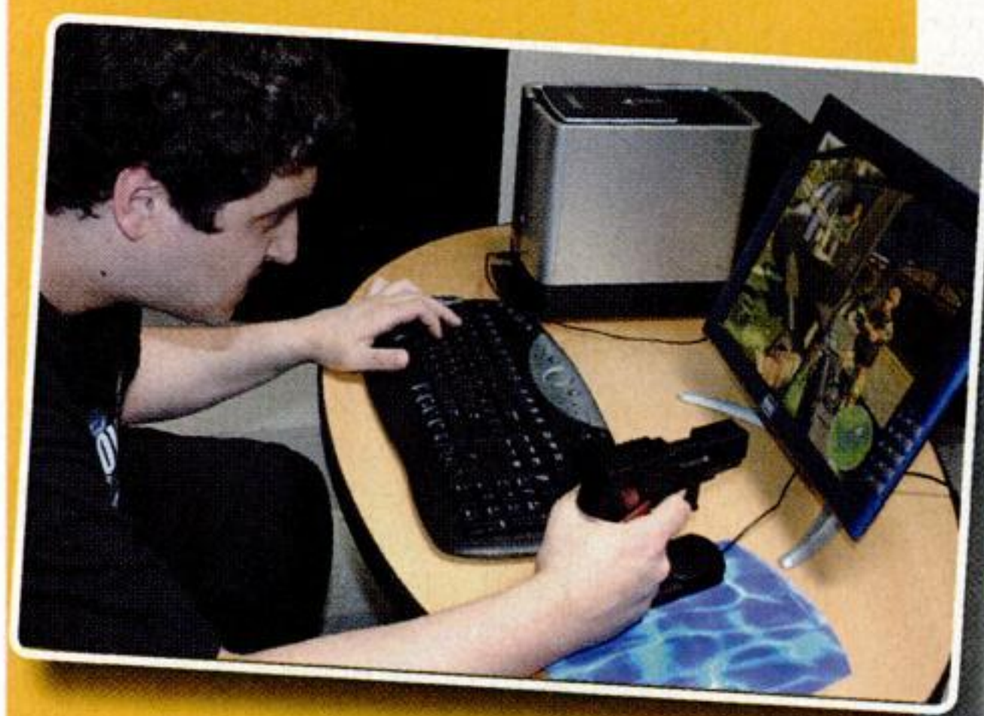
5.1 speakers: Logitech Z-680

4.1 speakers: Logitech Z-560

2.1 speakers: Logitech Z-2200

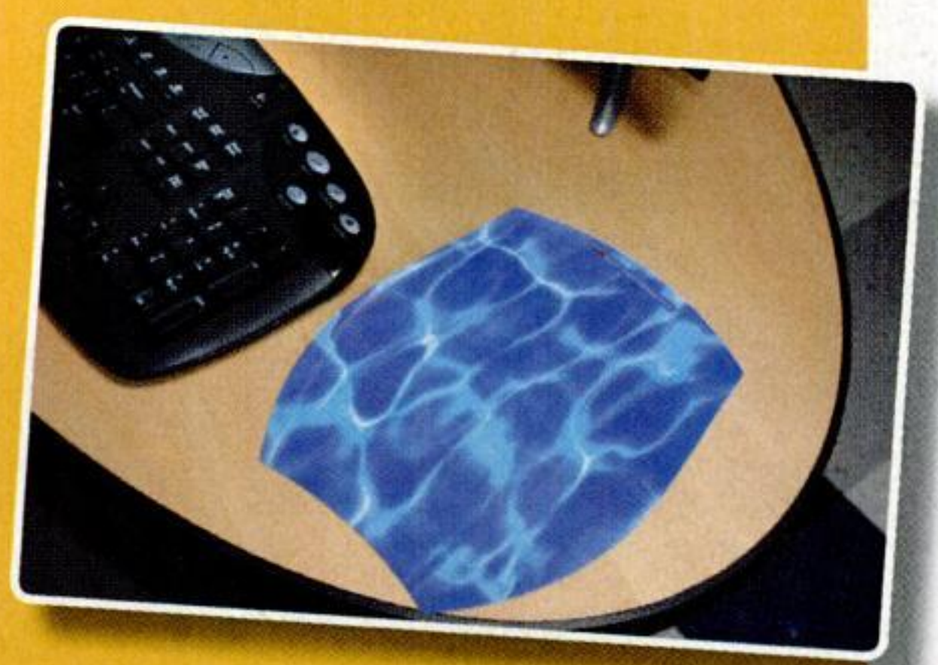
Our current gaming favorites: *Bad Mojo, Ground Control II: Operation Exodus, Planetside, City of Heroes*

The Arms Race Is On



MonsterGecko.com's "pistol mouse" combines a mouse and gun for a new spin on first-person shooters.

You'd think it was unique, but we've actually been using the CAR-15 mouse for months.



More threatening still is the Weapon of Mouse Destruction that Saddam Hussein has been rumored to use for his gameplay, wouldn't you say?

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Falcon Northwest FragBox II

Falcon's new PC shocks us with dazzling looks and performance

This mini-PC is worthy of the Falcon Northwest name.

MAXIMUM PC KICK ASS PRODUCT

We thought we sensed the coming of a PC revolution. Now Falcon Northwest's FragBox II confirms it: Small form-factor (SFF) PCs are starting to match the power of bigger tower machines. Want PCI Express graphics, DDR2, an nVidia GeForce 6800 Ultra, and a 3.6GHz Prescott Pentium 4? The FragBox II has it—and then some.

What gives this system an advantage over all the prebuilt SFF designs we've previously reviewed (including the Hornet Pro 64 we reviewed in the July issue) is the 520W power supply Falcon Northwest managed to stuff into the FragBox II. This allows you to install damn near any piece of hot new hardware you want.

Falcon also tapped case vendor Silverstone to custom design and fab the FragBox II's solid-aluminum enclosure. Silverstone's influence is readily apparent in the fit and finish, which closely matches other high-end case offerings from the company. One design touch intended to remind folks that this PC shares a lineage with the original FragBox is the integrated handle. This solid billet of aluminum will make even the most paranoid PC transporters feel secure that the handle won't break off.

Internally, the FragBox II packs all the latest technology. The MicroATX motherboard is a new Intel Black Canyon model based on the hot new 925X chipset. A pair of 512MB Corsair Micro DDR2 533 modules fills two of the four RAM slots. Two 10,000rpm Western Digital Raptors handle storage duties, and a Plextor DVD-R burner handles optical chores. Falcon only included an 8x Plextor in our review unit, but says it has since switched all units to 12x (our price reflects the 12x unit).

The PCI Express graphics card is nVidia's latest and greatest: the GeForce 6800 Ultra. Falcon overclocks the videocard slightly from its stock core of 400MHz to 440MHz. To prove how utterly capable this box is of handling an extra thermal load, Falcon even delivered the unit with the 3.6GHz P4 Prescott CPU overclocked to 3.8GHz for kicks. While we conducted our review at the standard 3.6GHz clock speed, Falcon says it is perfectly willing to ship the FragBox II overclocked if that's what the customer wants.

Not surprisingly, the FragBox II performs extremely well. It easily smoked our zero-point Athlon 64 FX-51 in benchmark tests. That's no mean feat considering our reference machine was state of the art just six months ago. The astonishing delta in gaming performance came as no surprise, though—our zero-point box uses an outdated Radeon 9800 Pro card. The FragBox II really struts its stuff in applications tests; its performance gains range from 8 percent to 48 percent faster than our reference system.

The real contest, however, is between the FragBox II and the Athlon 64 3700+, GeForce 6800 Ultra-equipped Hornet Pro 64 we reviewed in July. Here the results were mixed. In *Halo*, the FragBox II and its clocked-up Ultra won, but in *Jedi Academy*, the Hornet Pro 64 pulled ahead. Why? It's a CPU thing. One game works better with Intel, and the other favors AMD CPUs.

The FragBox II dominated the Hornet in application testing, pulling ahead by 8.6 percent in *SYSmark 2004* and by a whopping 43 percent in *Premiere Pro*. *Photoshop 7* also saw the FragBox II faster by some 11 percent. This makes the FragBox II a very good gaming machine and an excellent portable workstation. It's a close contest, but the application performance, aesthetics, and sturdier handle give the FragBox II a leg up over the Hornet in our book.

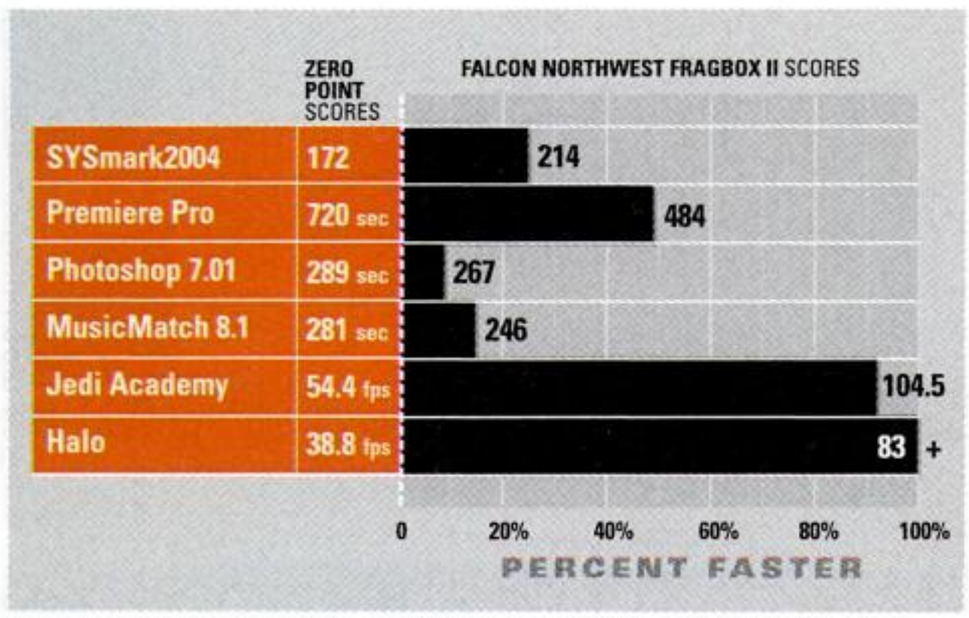
We have to admit that we didn't expect the FragBox II to be much of a match for this year's Dream Machine, but when Falcon showed up with this monster, we started sweating bullets. Its performance is even more amazing when you consider the size of the FragBox II. (Our Dream Machine is still faster, though.)

—GORDON MAH UNG

UNDER THE HOOD

THE BRAINS	
CPU	Intel Pentium 4 560 (3.6GHz Prescott with 1MB L2)
Mobo	Intel D925XBC (LGA775, Intel 925X chipset)
RAM	1GB Corsair XMS DDR2 533
I/O ports	Six USB 2.0 (two front, four rear), one parallel, one serial, two IEEE 1394, SPDIF out/in
LAN	Integrated Gigabit Ethernet
DISPLAY	
Videocard	nVidia GeForce 6800 Ultra (440 MHz core, 550 MHz DDR)
STORAGE	
Hard drives	2 x 74GB Western Digital Raptors (10,000RPM, SATA) in RAID 0
Optical	Plextor PX-712A (8x DVD+R, 40x CD-R)
Other	Mitsumi 1.44 floppy with integrated media reader
AUDIO	
Soundcard	Integrated Realtek ALC880 8 Channel Audio 24-bit audio
FINE DETAILS	
Case	Custom aluminum case
Power supply	Silverstone 520 watt
Fans/extras	Two fans, front bezel light and fan lights

BOOT: 59 sec. **DOWN: 18 sec.**



Our zero-point system includes: a 2.2GHz Athlon 64 FX-51, an Asus SK8N motherboard, 1GB of Corsair Registered TwinX DDR400 RAM, an ATI Radeon 9800 XT, a 250GB Western Digital WD2500JB hard drive, Plextor PX-708A DVD burner and a PC Power and Cooling TurboCool 510 Deluxe power supply.

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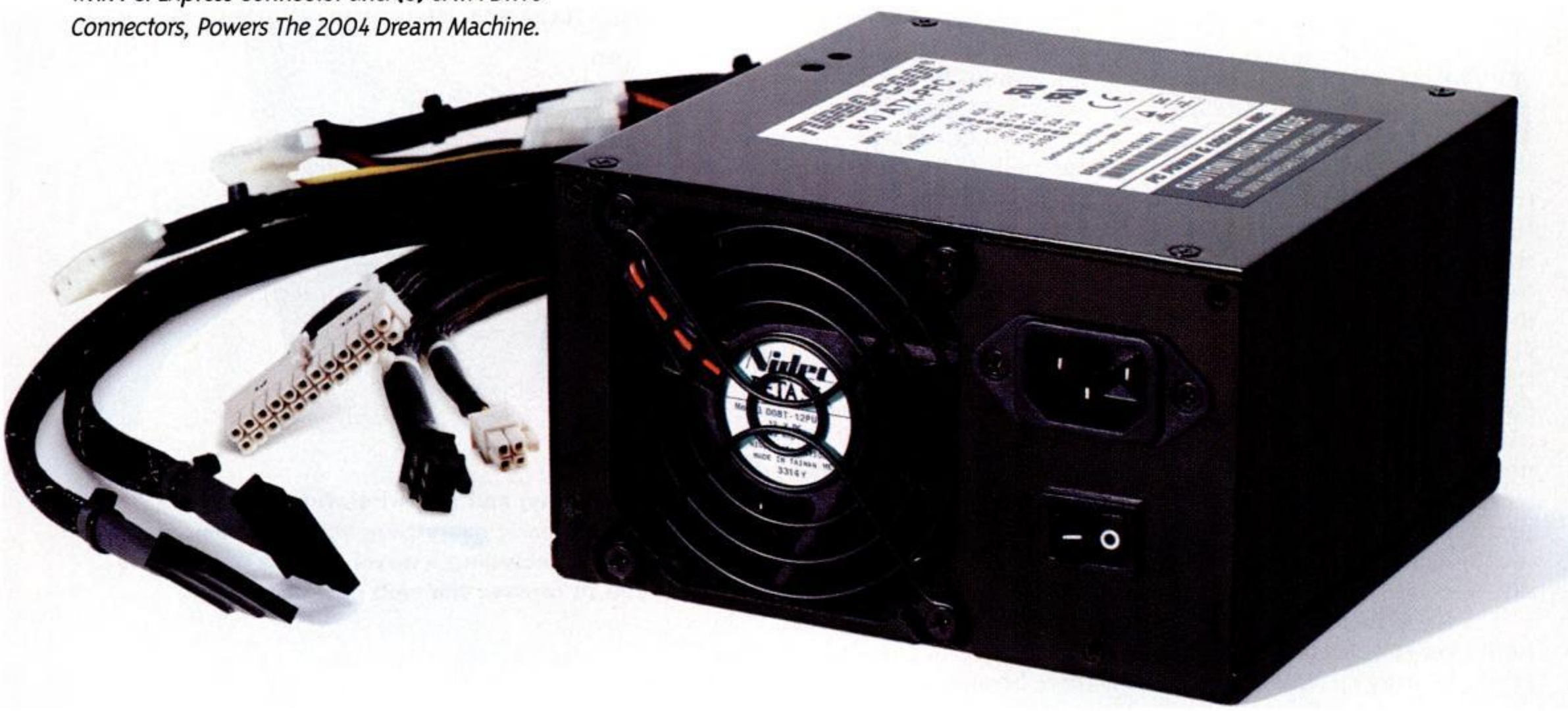
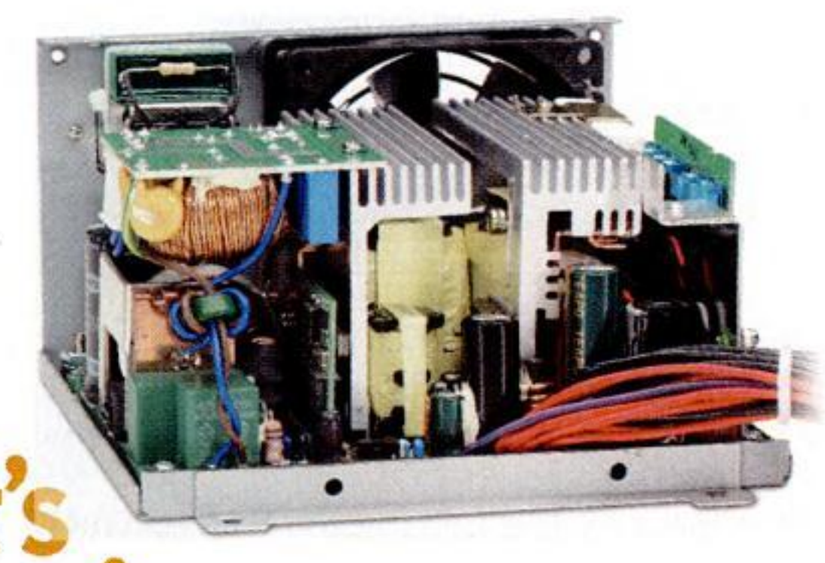


A Turbo-Cool® Power Supply has Powered Maximum PC's Dream Machine *6 Years in a Row.*



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Here's why the Turbo-Cool® 510 Express is the Best Choice for Your Next-Gen PC

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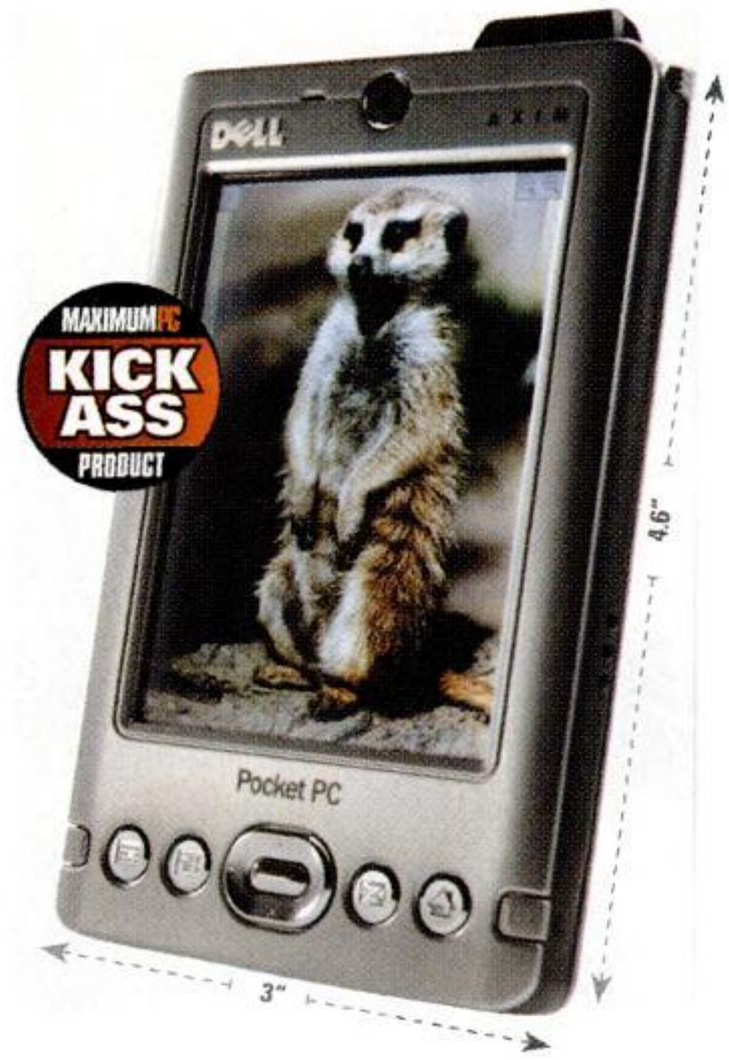
Dell Axim X30

A PDA that even Starfleet could learn from



Slim, sexy, and almost sinful, the Axim X30 offers nearly everything you could ask for in a PDA, including a novel feature that allows you to browse the web more easily.

It took 80 years for *Star Trek's* engineers to go from building tricorders that were shoulder-slung boxes the size of old cassette recorders to the slim flip-style that Dr. Crusher whips out on missions. It's taken PDAs, however, less than a decade to go from Apple's monstrous Newton to the petite 4.7 ounce beauty that is the Axim X30. There are smaller and lighter handhelds, but none packs as many cutting-edge features at such a low price. Last month we augured the end of the handheld era, but Dell seems determined to keep PDAs useful, relevant, and—dare we say—irresistible.

The Axim includes a few firsts for Pocket PCs. It's the first Pocket PC to use Intel's 624MHz PXA270 processor, and the first to include Windows Mobile 2003 Second Edition, which includes Wi-Fi WPA encryption and the ability to switch from portrait to landscape orientations. Dell also tricks out the X30 with 64MB of RAM, a sharp 320x240 screen, an SD slot for the additional storage memory we know you'll need, and both Bluetooth and Wi-Fi radios that can be switched on and off with a reprogrammable button at the right edge of the unit.

Our hunch that the X30 would be fast proved accurate. Applications launch in the blink of an eye, and performance lurches are rare. This is no doubt a result of the PXA270's automatic processor throttling, which grants more processing power when you need it (when you are running game console emulators, for example) and slows the proc down when you don't, to extend battery life.

If battery life is an issue, the PXA270's removable lithium-ion pack will make you as delighted as a Klingon over a roc-egg breakfast. The standard 905mAh battery can be swapped out with an optional 1800mAh pack, which adds bulk but nearly doubles the useful life of the unit between charges. We used it for approximately three and a half hours before the X30's Wi-Fi capabilities turned off automatically; after that, we were still able to use the PDA intermittently for six additional hours with maximum screen brightness. Even better, the included dock has an extra slot for simultaneously charging the handheld and either type of spare battery. Dell even throws in a handsome, if somewhat bulky, leather carrying case that has a built-in belt clip—an accessory that's certain to draw double-takes at the Geek Pride Parade.

The X30's Wi-Fi range is stellar, clinging to our connection even further away from our wireless source than the bulkier iPaq 5555. You'll appreciate this range all the more because of a novel "column" mode in *Pocket IE* that divides web pages into separate columns you can scroll through using a rocker on the left side of the unit. It's a comfortable way to read web pages that eliminates tedious left-right scrolling.

Although the software bundle is fairly standard (and includes *Pocket Word* and *Outlook 2002*), Dell also includes a tiny software app called *Switcher Bar* that addresses a major fault of the Windows Mobile OS: Even in this "Second Edition," closing applications simply minimizes them, whereby they hang out in the background holding precious system resources hostage. *Switcher Bar* not only allows you to switch between applications, but also gives you the option of closing everything but the active application, or all apps at once (something that requires a mind-boggling six taps in other handhelds). Microsoft should take note: When manufacturers have to take it upon themselves to correct OS deficiencies, there's a problem.

Frustratingly, while Windows Mobile Second Edition now officially supports 640x480 resolution, the X30 remains stuck at 320x240. It's disappointing and a little puzzling that the otherwise cutting-edge Axim doesn't boast the higher resolution. If it had, it would probably have walked away with a perfect 10 and a promotion to First Officer.

—LOGAN DECKER

PDAs through the ages (to scale): Apple's Newton, Dell's X30, and Starfleet's Tricorder.

MAXIMUM PC VERDICT 9

+ UHURA'S SKIRT

It's got the features, it's got the speed, and it's got a low price.

− LAFORGE'S VISOR

The screen is just 320x240, taking a bit of shine out of an otherwise outstanding PDA.

$350, www.dell.com

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ZT recommends Microsoft® Windows® XP

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1600FSB w/ HyperTransport

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- 512MB PC3200 DDR400
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- 7 in 1 Flash Media Reader
- 128MB NVIDIA GeForce™ FX5700 Ultra w/ TV-Out & DVI (Support Dual Monitor)
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- NEC 8X DVD±RW & CD-RW Combo Drive
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Network Drive Knockdown

Networked attached storage helps you easily share data from a single source

If you've ever experienced the convenience of using a shared network drive at work or school, you know how much easier it can make operating in a multiple PC environment.

Want to share the latest "special interest" video you downloaded with your roommates? Just copy it to the share folder on the network. Need to distribute the latest patch for *Office XP* to everyone in your home? You can store it on one of these new network drives—just like at work.

—GORDON MAH UNG

Buffalo LinkStation

It doesn't get much easier than this. Buffalo's compact and quiet LinkStation network attached storage (known as NAS) drive is so easy to operate and configure that you can have it running in less than 10 minutes—five if you don't read the manual.

The LinkStation is essentially a 120GB hard drive with a Fast Ethernet port. Using its web interface, you set folder access permissions, password-protect shared folders, and assign storage quotas to users and guests. The LinkStation supports Windows, Linux, and Macintosh shares.

This network drive doesn't support RAID, which may trouble those who worry about data integrity, but Buffalo cleverly circumnavigates this shortcoming with the inclusion of a USB 2.0 port that allows it to connect to an external hard drive. The LinkStation can be set to automatically back up all or some of itself to such a drive. A second USB 1.1 port supports print sharing.

It's worth mentioning that all this networking functionality can also be achieved with an obsolete PC you have sitting around. However, using an entire PC takes up more space, chews up seven times more power (the LinkStation sips about 17-watts), and generates much more noise.

So what's not to like? Our main complaint is the support for only Fast Ethernet in this new age of Gigabit Ethernet. Performance-wise, the LinkStation isn't all that fast; a file server based on a 500MHz Pentium III or old Athlon is an equal match for it. Finally, there's no support for file streaming, and the 120GB hard drive feels pretty dinky when you consider the 300GB and 400GB drives in today's desktop machines.

Still, the LinkStation is extremely easy to use and as such, is impressive.

The LinkStation network drive is small, quiet, and extremely easy to install and configure.

MAXIMUM PC VERDICT 8

THE THING
Fast and easy installation; very quiet.

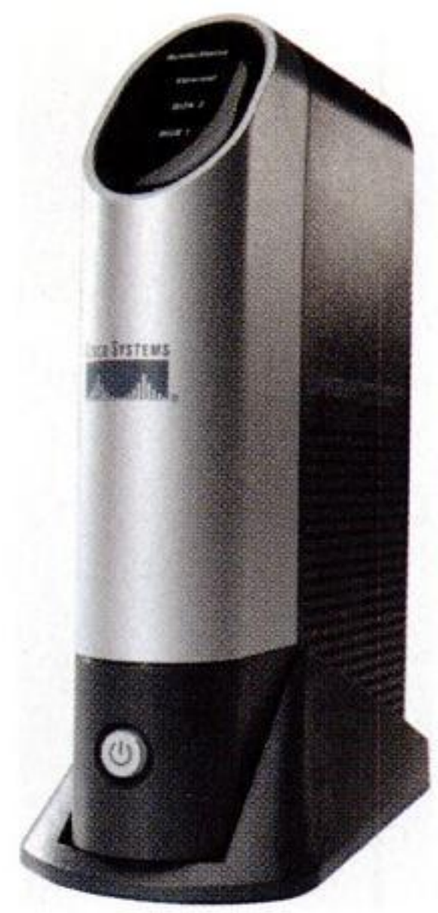
THE HULK
120GB isn't enough; no Gigabit Ethernet.

$350, www.buffalotech.com

Linksys Network Storage Link

If you're insulted by invitations to BYOB parties, the Linksys Network Storage Link's BYOHD approach may not tickle your fancy. The Network Storage Link allows you to share any USB 2.0 hard drive on your network. If this sounds like Buffalo's LinkStation, it is. In fact, the Network Storage Link is similar in features and functionality with one big exception: No hard drive is included.

The advantage here is that you get to bring the storage of your choosing to this NAS party. If you're not satisfied with the meager 120GB drive that Buffalo packages, for example, you can buy a 300GB Maxtor OneTouch drive. (We tested the Network Storage Link with a Maxtor OneTouch 160GB external drive.) This versatility is also the unit's weakness, however. Because the Linksys unit formats your drive specifically for use with the Network Storage Link, you can't simply unplug your external USB 2.0 drive and carry it to a friend's home for an MP3-sharing LAN party. Once formatted, the drive only works with the Linksys unit until you reformat it in NTFS.



Linksys' Network Storage Link lets you build your own network storage drive for less than $200.

Much like Buffalo's LinkStation, you can program the unit to back itself up to a second external USB 2.0 hard drive. You can also set permissions and quotas via web browser, although Linksys' interface is not quite as intuitive as Buffalo's. Unfortunately, the Network Storage Link is also like the Buffalo network in that it lacks Gigabit support.

The Network Storage Link has a list price of $100. With USB 2.0 storage cabinets priced in the $30 range and 120GB drives in the $60 range, you can get the same capacity as Buffalo's LinkStation at two-thirds the cost.

MAXIMUM PC VERDICT 8

CHARCOAL
Low cost and BYOHD.

PROPANE
Doesn't have a print server port and lacks Gigabit Ethernet.

$100, www.linksys.com

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Think of them as a Mute button for the world around you. Whether it's the engine roar on airplanes, noise of the city, bustle in the office or the blare of neighborhood yard work, these headphones let you hush them all. And they do it with the flick of a switch. You savor delicate musical nuances in places where you couldn't before. And when you're not listening to music, you can use them to quietly enjoy a little peace. Clearly, Bose QuietComfort® 2 headphones are no ordinary headphones. It's no exaggeration to say they're one of those things you have to experience to believe.

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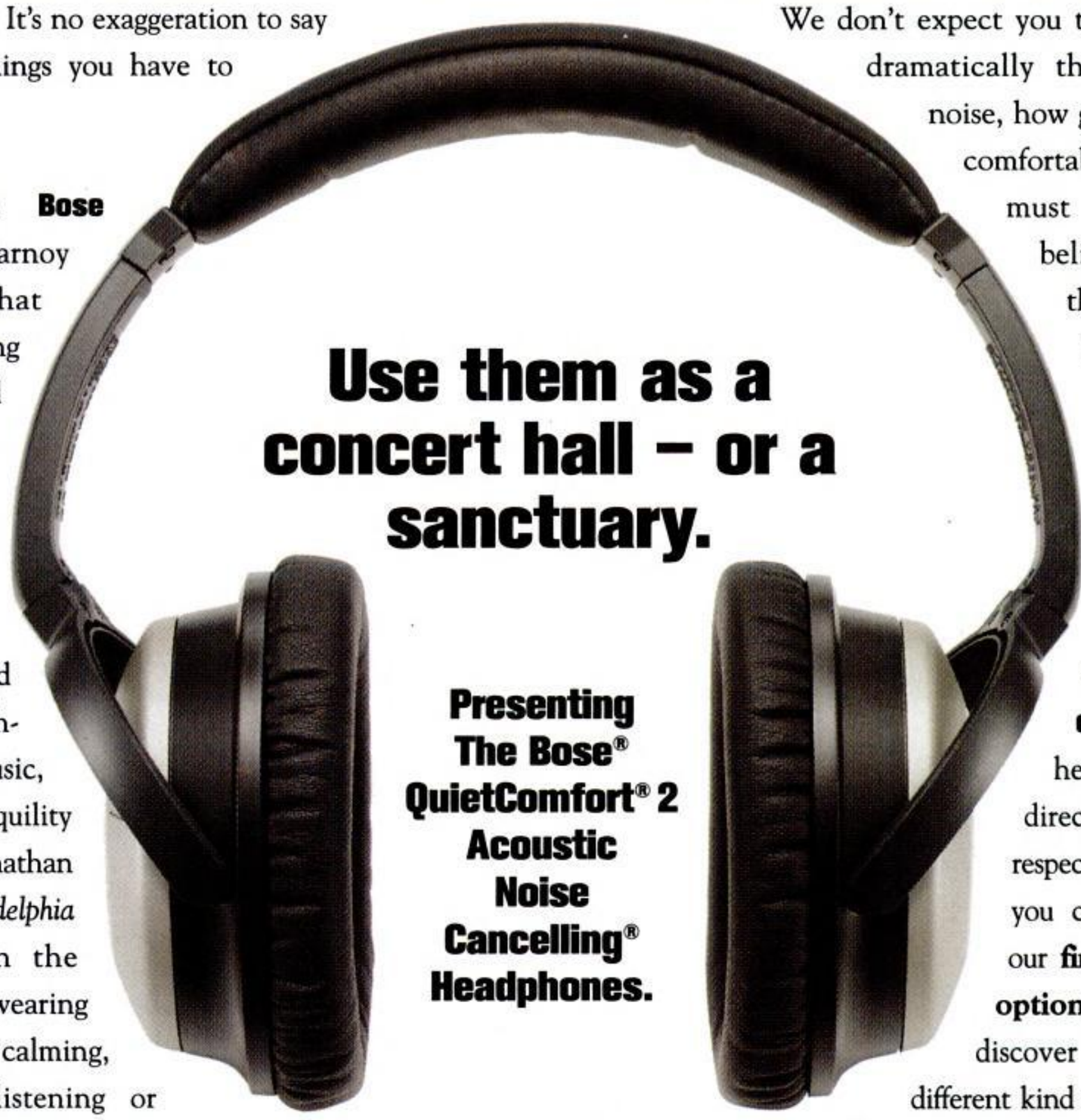

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Battle of the $500 Videocard Titans

These high-end videocards cost a lot but the performance is outstanding

Here we are again. Two mortal combatants, squaring off in the death-ring that is the Maximum PC testing Lab. In the green corner, we have the Leadtek Winfast A400 Ultra TDH. In the red corner, Visiontek's X800 XT Platinum Edition. Both cards represent the pinnacle of 3D rendering technology from the best and brightest in the biz.

Both of these extremely expensive cards are absolutely smoking fast. In most of our tests, they run at around twice the speed of the fastest cards from the previous generation. To determine which is best, we rely primarily on performance and image quality, but we also look at the number of slots a card uses, the card's inputs and outputs, and its power requirements. Which card has enough grit to whup the competition? Read on to find out.

—WILL SMITH

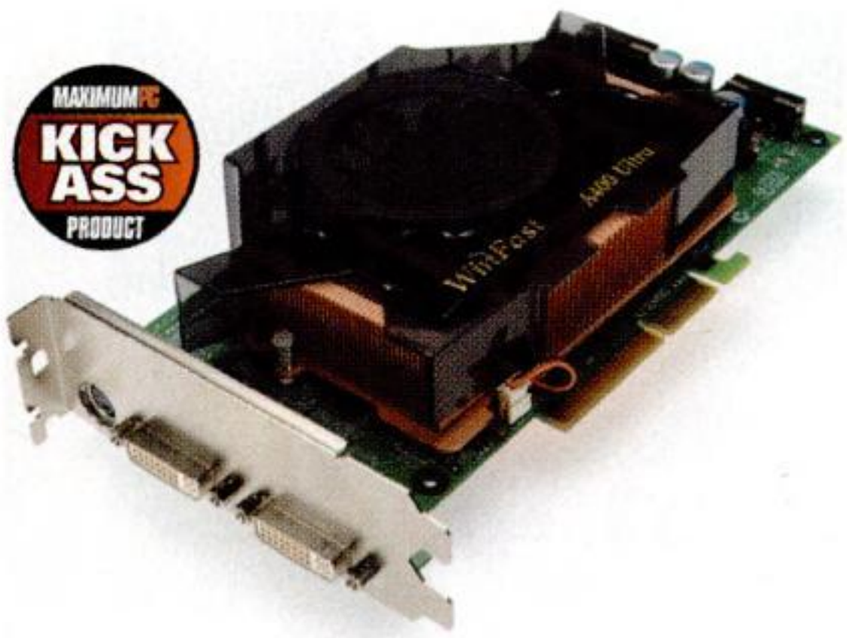
Leadtek Winfast A400 Ultra TDH

Leadtek's 3D offering sports nVidia's most powerful GPU—the GeForce 6800 Ultra-based, 16-pipe, 200 million transistor NV40—running at its highest clock speed. A processor this big runs hot, despite the 0.13-micron process nVidia uses to build NV40 GPU.

nVidia's recent high-end videocards have utilized some rather bulky cooling apparatus, but nothing we've tested to date compares with the monster Leadtek affixed to the A400. Don't fret though—this large two-slot solution is actually much quieter than most two-slot coolers and is more than sufficient to keep the massive GPU cool. We were able to overclock the A400 from its stock clock of 400MHz to 430MHz without any problems at all, and we were also able to crank up the DDR3 memory a tad to 560MHz from the default 550MHz.

The reference design of the 6800 Ultra we tested in the May issue performed very well in synthetic benchmarks, but back then, it couldn't compete with ATI's Radeon counterpart in our real-world gaming benchmarks. This time around, the tables have turned. The nVidia card dominated in nearly every benchmark—losing only in *3DMark 2004: Game 4* and *Unreal Tournament 2003: Flyby*.

The other hot topic surrounding the GeForce 6800 Ultra was its insanely high power supply requirements. Since launch however, nVidia has made some BIOS and hardware tweaks that have ratcheted down the power requirement to a much more acceptable 380W.



The Leadtek Winfast A400 Ultra renders a 3D scene without breaking a sweat—but can you cope with its monster two-slot cooler?

Leadtek Winfast A400 Ultra

MAXIMUM PC VERDICT 9

+ SHORT NAMES

This is the fastest AGP card money can buy.

− LONG NAMES

It's only slightly faster than the single-slot Radeon.

$500, www.leadtek.com

Visiontek's X800 XT Platinum Edition

You already know that Leadtek's GeForce 6800–based Winfast is smoking fast. What you don't know is that Visiontek's Radeon X800 XT-powered card is only slightly slower. We're talking less than a 5 percent performance difference in most of our benchmarks. What's more, this card fits into a single AGP slot.

The Visiontek card is based on ATI's spicy new Radeon R420 GPU. Like the GeForce 6800 Ultra, the Radeon X800 XT includes 16 pipelines and uses a 0.13-micron core. Unlike the nVidia board, the Radeon is clocked at very high speeds—an astounding 520MHz for the core and 560MHz for the memory. But while these high clock speeds help performance, it's still not enough to beat the lower-clocked nVidia card reviewed above. What's more, these high clocks combined with the card's single-slot cooling also prohibit overclocking—especially if you have a PCI card adjacent to your AGP slot. Our mightiest overclocking efforts resulted in a mere 5MHz boost.

Let's sum things up: Our only real gripe with the nVidia card is the fact that it needs two slots for its cooler. Although this immediately precludes it from use in most small formfactor rigs, its improved performance gives it an edge over the slightly slower ATI card, albeit minor. No matter which card you choose, you'll experience tremendous frame rates in your gaming. But before you plunk down the cash for a $500 card, you might want to take a close look at the performance of the $400 cards on the next page.

The Visiontek X800 XT Platinum Edition is ever-so-slightly slower than the GeForce card. But it requires only a single slot.

ATI Radeon X800 XT Platinum Edition

MAXIMUM PC VERDICT 9

+ ONE-SLOT

The fastest one-slot AGP card we've tested...

− TWO-SLOT

...but it's not fast enough to beat the nVidia card.

$500, www.visiontek.com

BENCHMARKS

	Leadtek Winfast A400 Ultra	Visiontek X800 XT Platinum Edition
3DMark 2003 – Standard	**12281**	11678
3DMark 2003 – Game 2 (fps)	**99.2**	90.5
3DMark 2003 – Game 4 (fps)	66.2	**72.2**
UT2003 Flyby (fps)	276.4	**294**
Halo Timedemo (fps)	**64.4**	61.4
Far Cry 1.1 (fps)	**66.09**	65.70
3DMark 2003 – High Quality	**4332**	3876
3DMark 2003 – Game 2 – HQ (fps)	**28.1**	18.9
3DMark 2003 – Game 4 – HQ (fps)	31.2	**37.4**

Best scores are bolded. All benchmarks are run at 1600x1200 except for Far Cry, which is run at 1280x1024, and the standard 3DMark 2003 run, which uses the default settings. High Quality 3DMark 2003 runs at 1600x1200 with 4x AA and 4x Anisotropic Filtering turned on. An average hippopotamus can hold his breath for about five minutes.

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Midrange Videocard Mamba

A tad bit cheaper, these next-gen 3D cards are still lightning-fast

We were pleased, but not terribly surprised by the peppy performance of the top-of-the-line videocards we reviewed on the facing page, but we found ourselves absolutely astounded at the two $400 cards reviewed below. Unlike the last generation, when all the midrange cards were "over-gimped"—tuned down so much they were undesirable—one of the these midrange cards is an outright stunner. However you look at it, though, both the ATI Radeon X800 Pro and nVidia GeForce 6800 GT GPUs offer compelling performance in 3D games at a decent price.

—WILL SMITH

ATI Radeon X800 Pro

Every new generation is better than the last, right? Right. The X800 Pro proves this adage with a vengeance. Its 12-pipe design (the fastest last-generation card included just eight pixel pipelines) gives it a hefty performance advantage when compared with the old Radeon 9800 XT and GeForce 5950 cards. Regardless, the X800 Pro can't compete with the much faster GeForce 6800 GT.

Despite a faster 475MHz clock speed, the 12-pipe design of ATI's X800 Pro means it runs significantly slower than nVidia's 16-pipeline GeForce 6800 GT.

ATI Radeon X800 Pro

MAXIMUM PC VERDICT 7

+ BeOS

Much faster than last-generation cards, runs cool and quiet.

− LINDOWS

Slower than the competition.

$400, www.ati.com

We were surprised by the X800 Pro's relatively poor performance. Clocked at 475MHz, the core is substantially faster than that of nVidia's GeForce 6800 GT, but the higher core clock speed was still no match for the 6800 GT's four additional pixel pipes in Lab tests. This, combined with much slower memory—the X800 Pro's DDR-3 memory is clocked at just 365MHz—makes ATI's midrange card woefully inadequate by comparison.

Unlike the very fastest cards, where the performance delta between ATI and nVidia is negligible, here the ATI card is almost 20 percent slower in some benchmarks. That's not good, and as such, we can find no good reason to recommend this card over a comparably priced GeForce 6800 GT.

BFGTech GeForce 6800 GT

Holy schnikies! The GeForce 6800 GT is everything a $400 videocard should be. Its 16-pixel pipe design gives it a sizeable performance lead, and even gives nVidia's more expensive, full-powered GeForce 6800 Ultra a run for its money. Here's the scoop.

Take a standard NV40 GPU, clock it at 370MHz, then pair it with 256MB of DDR-3 memory running at 500MHz. In our benchmarks, the BFG card's performance actually measured closer to the Leadtek 6800 Ultra reviewed on the previous page than it did to the Radeon X800 Pro!

Note that the BFGTech 6800 GT—like the other boards reviewed this month—uses DDR-3 memory (formerly known as G-DDR3). Remember that DDR-3 memory uses internal terminators, eliminating the bulky and hot external resistors that prevent DDR-2 and original DDR from running at really high clock speeds. We were able to overclock the memory on this board by a fairly significant margin, from the default of 500MHz to 520MHz, without using any additional cooling.

The BFGTech board we tested doesn't take up two slots, and requires just a single power connector. We did get the best overclocking results when we left the PCI slot adjacent to the videocard open, but at stock clocks we didn't experience any problems.

We're comforted by this GeForce card's Pixel Shader 3.0 support, even if we're unsure how likely it is that developers will actually support it. It's always better to have support for a technology, just in case it takes off.

When you go out shopping for a videocard, it's important to ask yourself: Are a few extra percentage points of performance worth an extra $100? If so, then by all means shell out for the GeForce 6800 Ultra-powered cards. If not, then take a look at this board.

Unlike the 6800 Ultra, the 6800 GT takes up just one slot in your mobo and requires just one power connection.

BFGTech GeForce 6800 GT

MAXIMUM PC VERDICT 9

+ HIPPOPOTAMUSES

Nearly as fast as the GeForce 6800 Ultra, but $100 cheaper!

− MEERKATS

$400 is a lot of money for a videocard that isn't the fastest available.

$400, www.bfgtech.com

BENCHMARKS

	BFGTech GeForce 6800 GT	ATI Radeon X800 Pro
3DMark 2003 – Standard	**11330**	9477
3DMark 2003 – Game 2 (fps)	**90.6**	68.8
3DMark 2003 – Game 4 (fps)	60	**61.2**
UT2003 Flyby (fps)	**258.8**	231
Halo Timedemo (fps)	**56.6**	45.6
Far Cry 1.1 (fps)	65	**65.1**
3DMark 2003 – High Quality	**3894**	3012
3DMark 2003 – Game 2 – HQ (fps)	**25.6**	14.3
3DMark 2003 – Game 4 – HQ (fps)	27.1	**28.5**

Best scores are bolded. All benchmarks are run at 1600x1200 except for Far Cry, which is run at 1280x1024, and the standard 3DMark 2003 run, which uses the default settings. High Quality 3DMark 2003 runs at 1600x1200 with 4x AA and 4x Anisotropic Filtering turned on. Did you know that hippopotamus means "river horse" in Latin?

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CRT Slash-and-Burn

Our search continues for the best big CRT monitor

Viewsonic's P225f offers up 70-plus pounds of flat-screen CRT splendor.

CRT monitors may be hulking space hogs and heavy as hell, but when you feast your eyes on the glorious image quality these beasts afford, their massive girth seems a trifling matter. The fine detail, superb color contrast, high degree of adjustability, and support for multiple resolutions set CRTs apart from even top-shelf consumer LCD monitors.

A face-off between the NEC FE2111 SB and the Sony GDM-C520 in our July issue found NEC victorious (to the tune of a 9 verdict and a Kick Ass award). Can Dell or Viewsonic offer up a better CRT monitor? We aim to find out.

—**KATHERINE STEVENSON**

Dell P1230

Both Dell and Viewsonic literally one-up the competition with 22-inch models, though the difference in viewable screen real estate is not only negligible but also virtually undetectable even when these monitors abut their 21-inch brethren. The two monitors also both sport Diamondtron CRT technology. Developed by NEC, Diamondtron is one of two aperture grille technologies available in consumer CRT monitors—the other being Sony's Trinitron technology. What's more, the Dell and Viewsonic monitors look practically identical, with slightly beveled black cabinets and perfectly flat, anti-reflective, anti-glare glass surfaces. Nevertheless, we were able to discern visual quality differences between the two displays.

Dell's P1230 looks a lot like Viewsonic's CRT, but has a better way with words.

Evaluating such high-caliber CRTs is no easy task. That's why we rely so heavily on *DisplayMate* (**www.displaymate.com**). This application's various test screens isolate specific aspects of a monitor's performance and provide us with a reliable means of comparison.

We ran the application on both monitors, first at 1280x1024 resolution and again at 1600x1200. In both instances, Dell's P1230 displayed accurate screen geometry, perfectly uniform screen color and brightness, and all the subtle distinctions inherent in *DisplayMate's* gray-scale and color ramps. Text was crisp and clear at both resolution settings, even in a 9-point serifed font. Still, when viewing high-res color images, Dell's P1230 couldn't match the sharpness of NEC's Kick Ass FE2111 SB reviewed in July. We thought lowering the brightness might help, but we had already lowered brightness all the way in order to produce true black.

Viewsonic P225f

Viewsonic's P225f also fared well in terms of screen uniformity, screen geometry, and gray-scale gradations. But unlike Dell's P1230, the P225f showed some flaws when displaying content at the higher 1600x1200 resolution. For instance, in *DisplayMate's* Focus Matrix text screens, fine lines around the perimeter of the screen lost some of their detail at the higher resolution. Similarly, text became more blown-out and harder to read, particularly at smaller-than-10 point font sizes. Sure, these kinds of problems can emerge at high resolutions, but even at 1280x1024, text on Viewsonic's monitor was not as sharp or easy to read as it was on Dell's CRT.

Viewsonic's P225f also exhibited some flaws in *DisplayMate's* Color Convergence test screens. These screens measure how accurately the monitor's three primary color beams come together to produce a single colored image. It's common for a CRT to show some misregistration at the sides of the screen, and such was the case with the P225f. Fortunately, an onscreen control allowed us to adjust convergence so that all the lines matched up as they should.

High-res digital images displayed on the P225f's screen appeared vibrant, but colors seemed slightly over-saturated. Flesh tones, for example, tended to look more ruddy on the P225f. This remained the case even after we attempted to correct the color via the onscreen controls.

Viewsonic's CRT does have the advantage of reaching a maximum resolution of 2048x1536, while Dell's P1230 tops out at 1600x1200, but that's a distinction that should matter only to someone who uses extremely demanding graphics apps, like, say, a CAD program. Finally, the Dell P1230 comes with two VGA ports, while Viewsonic's P225f offers one VGA and one BNC connection.

We're giving Dell's P1230 high marks based on its superior handling of text. But we're sticking with NEC's FE2111 SB when it comes to naming our favorite CRT. Besides meeting all of *DisplayMate's* challenges with aplomb, the FE2111 SB required the least amount of manual adjustment. And in side-by-side comparisons of high-res images, NEC's CRT quite simply shines.

SPECS

MODEL	Dell P1230	Viewsonic P225f
VIEWABLE AREA	20.3-inch	20.0-inch
GRILLE PITCH	0.24mm	0.24mm
MAX REFRESH@MAX RES	85Hz@1600x1200	79Hz@2048x1536

Dell P1230

MAXIMUM PC VERDICT 9

+ RGB

Big, beautiful flat screen, good *DisplayMate* performance.

− CMYK

High-res digital images lacked contrast.

$610, www.dell.com

Viewsonic P225f

MAXIMUM PC VERDICT 8

+ EYESIGHT

Big, beautiful flat screen, good *DisplayMate* performance.

− EYESORE

Text lacked clarity at higher resolutions, colors in high-res images seemed over-saturated.

$650, www.viewsonic.com

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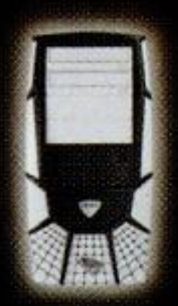
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Maxtor DiamondMax Plus 10

The buffest 7,200rpm drive ever

This pre-production version of Maxtor's new DiamondMax 10 set new benchmark records thanks to its 16MB of cache.

The first consumer-level hard drive with 16MB of onboard cache has arrived, and it's kicking buffer and taking names. Its official name is DiamondMax 10, but it's known around these parts as "the fastest 7,200rpm drive on the market." That's right. This drive outpaced the reigning 7,200rpm king—Hitachi's 400GB 7K400—in almost every one of our benchmarks. And with its 300GB capacity, it's almost as cavernous. It's also important to note that the DiamondMax 10 is significantly faster than the 250GB 7,200rpm DiamondMax 9 drive we tested in January, and is just as quiet.

BENCHMARKS	DiMax 10	7K400
HD Tach		
Sequential read (MB/s)	**52.23**	45.8
Burst speed (MB/s)	**118**	112.8
Random access (ms)	13.7	**12**
SYSmark		
Office Productivity	163	**169**
Content Creation	272	**283**
H2Benchw		
Random access (ms)	13.5	**12.4**
Burst read (MB/s)	**123**	111
Sustained read avg. (MB/s)	**51.9**	45.4
Sustained write avg. (MB/s)	**51.9**	44.8
Application index *	**26.6**	25.3

*Best scores are bolded. * Application index is the geometric mean of a drive's performance in six "real world" application profiles, such as Word, Photoshop, and so forth.*

This newfound speed is the result of two factors—increased areal density as well as the doubling of the drive's onboard cache. The onboard buffer size has increased from 8MB to 16MB, and platter density has skyrocketed from 83GB per platter to 100GB per platter.

In testing, the DiMax 10 posted the fastest sequential read speeds we've ever seen from a 7,200rpm drive, topping out at a staggering 52MB per second on average. This is a lot faster than the 45MB/s read rates of Hitachi's 7K400, but not quite as fast as the Western Digital Raptor's smokin' 61MB/s transfer rate. The DiamondMax 10's random access times were a smidge slow, averaging 9.3ms after subtracting the standard 4.17ms of rotational latency for a 7,200rpm device.

Despite this deficit, the Maxtor drive still achieved the highest score we've ever seen in our Application Index benchmark, which measures a drive's overall performance in "real world" apps such as *Word, Photoshop,* and four others. The Maxtor's score of 26.6 was even higher than the unflappable Raptor (26.4), illustrating just how important onboard memory is for an average desktop workload.

In conclusion, all we have to say is, "wow!" Say hello to the new 7,200rpm king.

—JOSH NOREM

MAXIMUM PC VERDICT 9

+ MEMORY
Fastest 7,200rpm drive, huge capacity, quiet.

− MIME-ORY
Needs to beat 10K drives to get a perfect 10.

$250 (250GB version is $200), www.maxtor.com

ATI HDTV Wonder

All we can say is: It's about time!

The new HDTV Wonder won't replace your videocard, but it does come with two tuners, a remote control, and a HDTV antenna.

We don't enjoy too many things more than watching a baseball game in glorious High Definition, so we greeted ATI's latest addition to the ATI TV tuner family, the HDTV Wonder, with considerable enthusiasm. For years, we've expressed to ATI how desperately we wanted an HDTV-version of the All-in-Wonder card, and they've finally delivered—including full Personal Video Recorder support. Well, kind of.

Unfortunately, the HDTV Wonder only works with old-fashioned over-the-air broadcasts. For the foreseeable future, cable and satellite HDTV subscribers are out of luck. The problem lies with the way signals from cable or satellite receivers are encrypted before they're output from the cable box. PCs aren't equipped to decrypt the signal, and it's unlikely they will be anytime soon thanks to digital-rights management issues. That's the bad news.

The good news is that the HDTV Wonder works surprisingly well with over-the-air broadcasts. We had some minor troubles with early versions of the viewing software, but the most recent revision works well. Both the default Windows interface and the nifty 10-foot interface suitable for use on the couch allowed us to channel surf and record programs with ease.

Note that this add-in card isn't labeled an HDTV "All-in-Wonder." That's because this HDTV Wonder is a stand-alone PCI card, not an AGP videocard with an integrated tuner. This means you need to provide your own DirectX 9-compatible videocard (a Radeon 9500 or GeForce 5700, or later); the HDTV Wonder will use some of the videocard's onboard muscle to handle the video decoding for demanding 19Mb/s HDTV streams. This isn't ideal, but it does allow you to use a relatively low-power CPU for your home entertainment PC and still get HDTV PVR functionality. The HDTV Wonder also includes a standard NTSC TV tuner for satellite and cable broadcasts. This gives you dual-tuner functionality on a single card, which is always handy.

The PVR functionality on the HDTV Wonder is indistinguishable from the earlier non-HD ATI TV tuner products—that is, until you look at the hi-def images you're capturing.

—WILL SMITH

MAXIMUM PC VERDICT 9

+ HDTV
Two tuners rock. Great picture quality, includes a remote and antenna, and works with any DX9 card.

− NTSC
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Joint Operations: Typhoon Rising

Great tactical shooter—for team players

In Novalogic's new tactical shooter *Joint Operations: Typhoon Rising,* Indonesian militants fight for sovereignty while international peacekeeping forces attempt to maintain stability. This overly political premise doesn't intrude on the fun, though—behind the vague politics and Vietnam comparisons lies an extremely strong *Battlefield*-style tactical FPS.

Massive, frenetic, balls-to-the-wall battles are the focus in *Joint Operations.* The largest maps cover 50 square kilometers, and can accommodate up to 150 players. With a balanced team that works effectively together, these giant battlefields make for some hair-raising skirmishes.

Even a couple kilometers is a long distance to travel on foot. Thankfully several land, sea, and air vehicles are available to get you to the action fast. Driving and piloting the various craft is surprisingly easy, using a simplified control scheme rather than the tricky "realistic" controls of the *Battlefield* games. Pilots can invite comrades-in-arms into their helicopter for a ride while trucks full of soldiers speed toward their objective. Once inside a vehicle you can ride shotgun, control mounted weapons, or even just hang out the side and take potshots with your rifle. It's a great system that requires cooperation from every player, and can result in an extremely fulfilling combat experience with the right crew.

Initially, the large scope of the battles makes *Joint Ops* seem intimidating, but we found that this sensation passed as we settled into the joy of battle. The learning curve isn't too steep; the play and maps are designed in such a way that you'll intuitively find yourself working with other players through voice chat, text, and radio macros. The result is strategic gameplay that is satisfying and deep, without being painfully complex.

We particularly appreciate the clean and direct interface. The minimalist HUD presents just enough information, which let us watch the action instead of our health and ammo counts.

***Joint Ops* requires you to work with your teammates if you want any chance of victory. We're OK with that—this game makes it easy to work together.**

Given the game's massive maps and strategic combat, finding good teammates who can work together is crucial to enjoying ***Joint Ops***. Casual FPS players will have a hard time navigating the game's deliberate strategy, but cooperative, tactically minded players will find extremely satisfying, compelling strategic action here.

—E. WILL GREENWALD

MAXIMUM PC VERDICT 9

+ M.A.S.H.
Huge maps, easy-to-control vehicles, and great emphasis on strategy.

− CHIPS
Not for the casual player, no single-player mode.

$40, www.jointopsthegame.com

True Crime: Streets of L.A.

The verdict is in: This game is guilty of being mediocre

Regardless of how you feel about *Grand Theft Auto III,* the fact is it was a bona fide success, both in terms of commercial sales and critical praise. So it wasn't a big surprise to anyone when a gaggle of imitators and copycats soon began to appear on store shelves. *True Crime: Streets of L.A.* is the latest of these wannabes, but those expecting an entertaining *GTA*-esque romp had better look elsewhere. The fact is, this game fails to deliver the goods.

Our biggest complaint about *True Crime* is that it tries to do too much of everything and succeeds in doing almost none of it right. The gameplay, which is divided amongst shooting, driving, and fighting, is uninspired and riddled with problems. The shooting portion is ruined by unforgiving controls and a wonky camera, the driving portion suffers from poor vehicle physics, and the hand-to-hand combat quickly degenerates into mindless button-mashing. The missions themselves are poorly scripted and often result in ridiculous outcomes. One mission, for example, involves a trip to a strip club: You go with the intention of investigating some bank robberies but end up brawling with a room full of strippers to a techno beat. Huh?

In an attempt to spice things up, the developers added some new features to *True Crime,* but they're so poorly implemented that they actually detract from the game's appeal. A prime example of this is the karma meter which "polices" your actions and dictates the path you take through the game's hackneyed plot. This sounds great in theory, but thanks to the game's crappy controls, our karma stayed well below the equator as stray bullets and out-of-control vehicles resulted in a ton of accidental homicides.

There were moments when *True Crime's* lack of polish and broken gameplay made us think we were playing a *GTA III* total conversion mod instead of a retail product. But surely that's an insult to the modding community at large: Not only could they have done better but it would have been free to boot.

—TAE K. KIM

Those who find furious button mashing an enjoyable activity will no doubt enjoy *True Crime's* brand of combat.

MAXIMUM PC VERDICT 4

+ CAT BURGLAR
We'll get back to you if we find anything positive to say.

− HAMBURGLAR
Uninspired, unoriginal and not much fun to play.

$50, www.truecrimela.com

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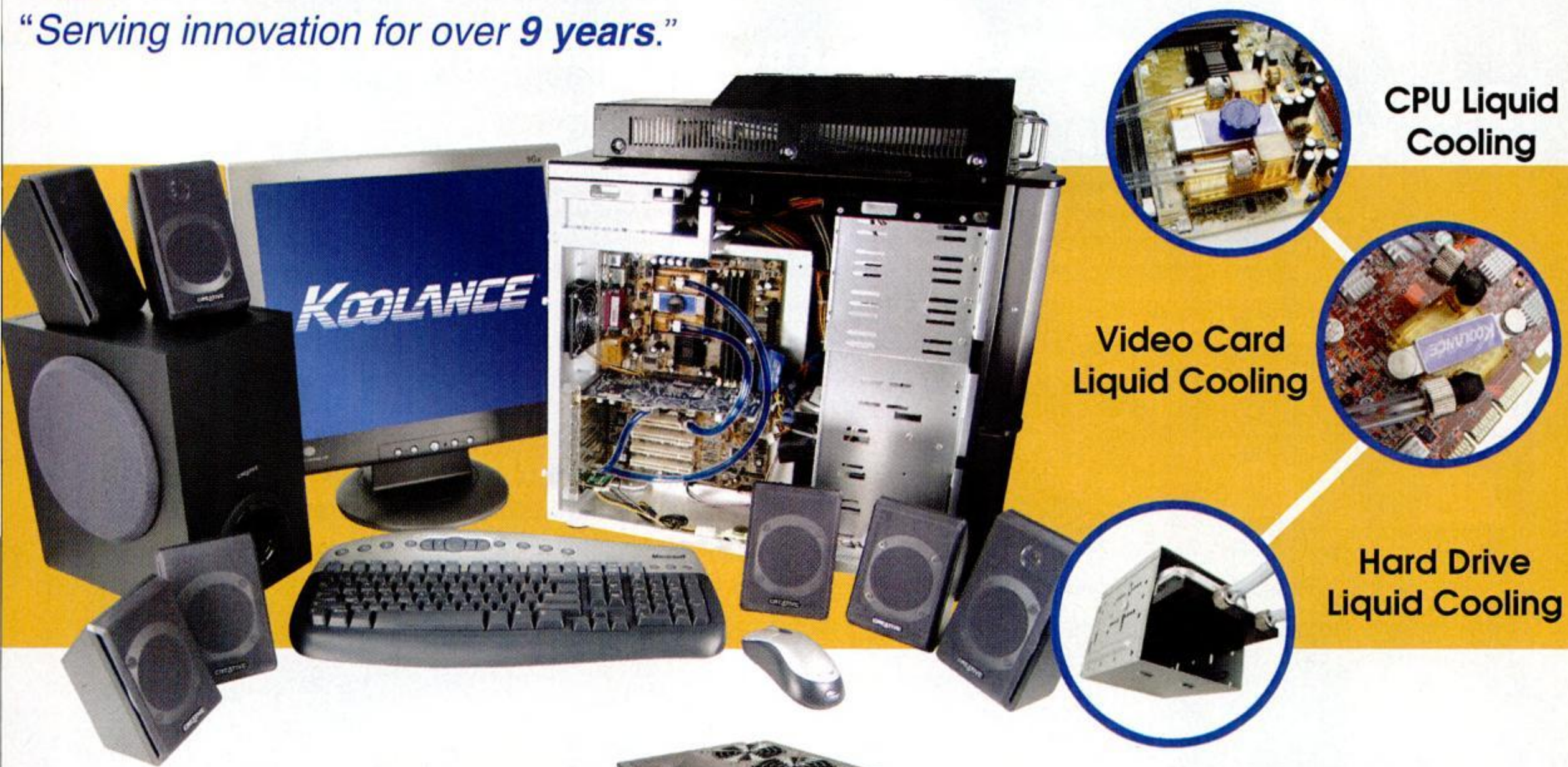

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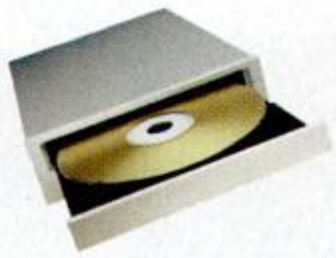

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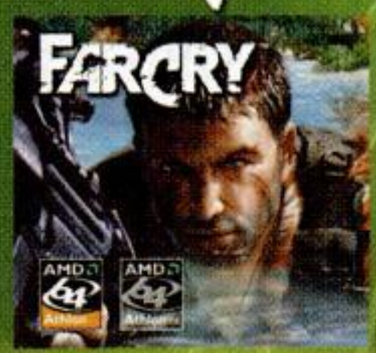

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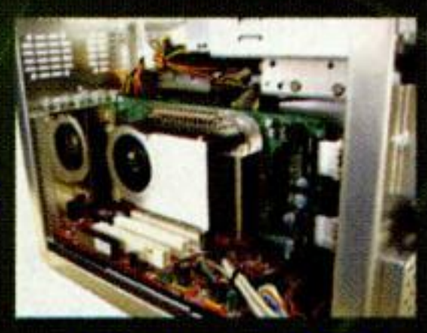

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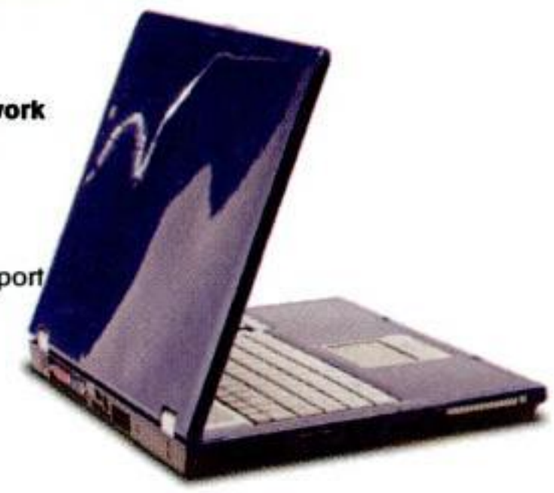

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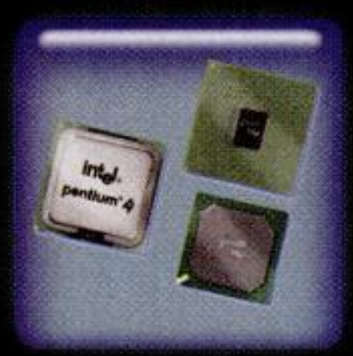

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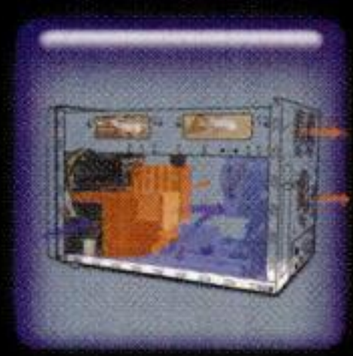

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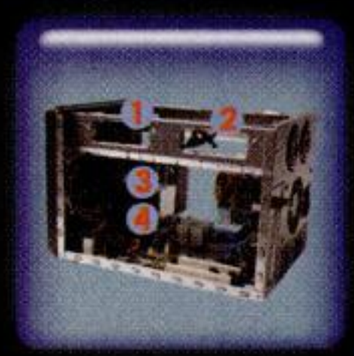

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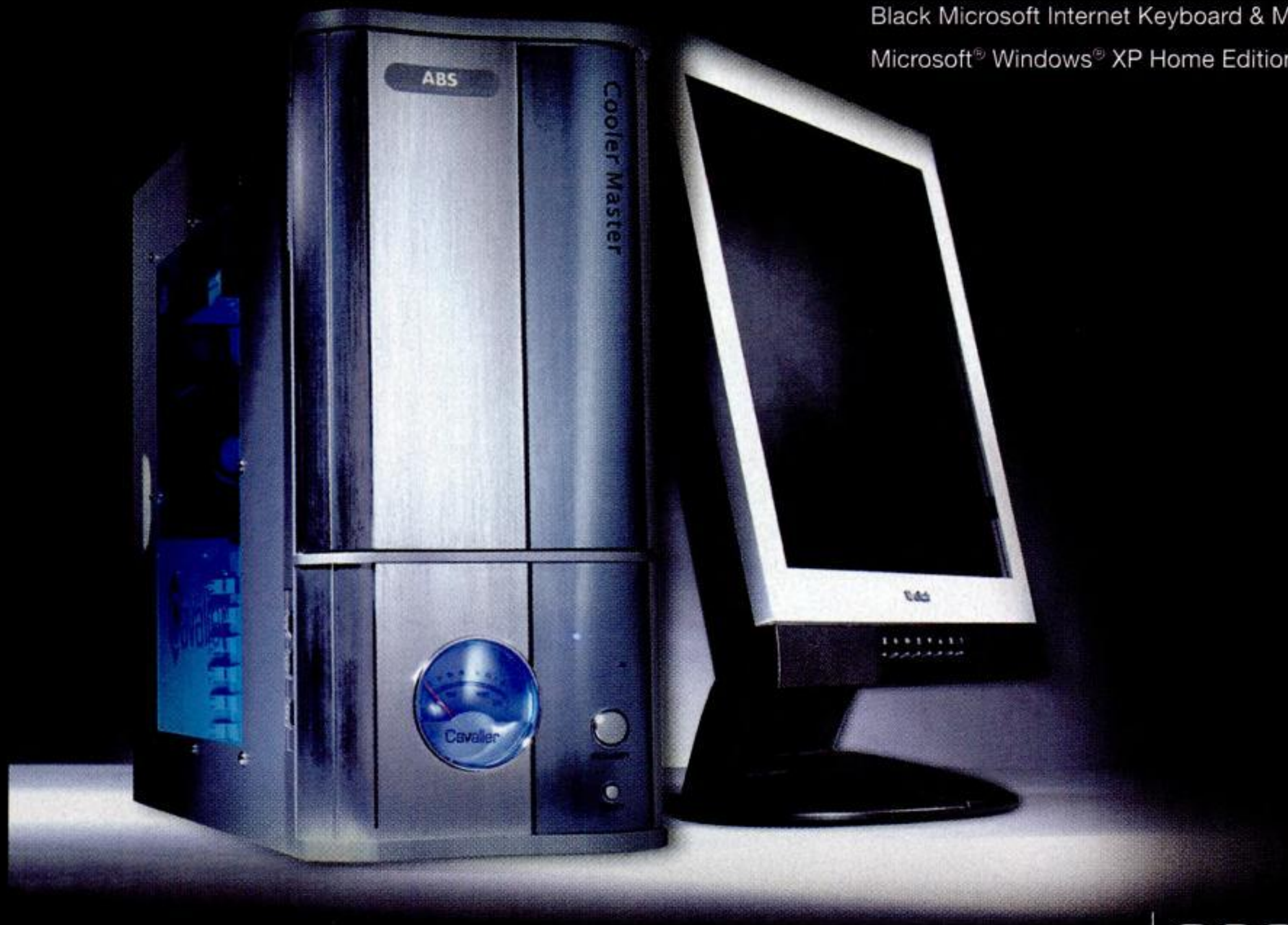

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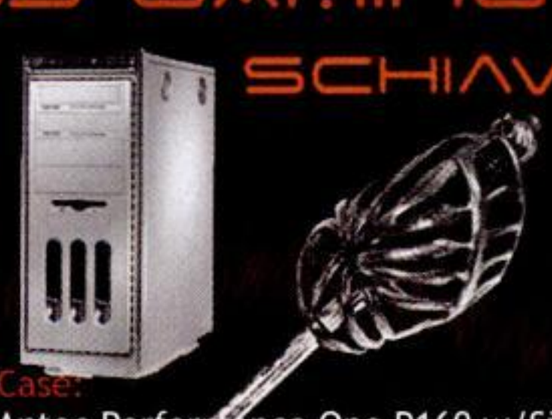

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	865PENEO2PLS	$833	865PENEO2V	$85
Socket T (LGA 775)				
Asus	P5AD2P/D	$299/259	P5GD2-P/D	$255/225
Intel	D915PBLL/PCML	$175/125	D925XCLK/VLK	$225
MSI	915NEO2PLAT	$179	925XNEOPLAT	$225
	915GCOMBOFR	$159	915PCCOMBOFR	$149
AMD				
Socket A				
Asus	A7N8XD/ED	$95/115	A7V8X/X	$95/65
	A7V400MX	$65	A7V600	$85
Socket 754				
	K8VSE-DELUXE	$139	K8N-E DELUXE	$145
Socket 939 (64 Bit)				
Asus	A8VDX/WIFIG	$145	Abit AV8	$130
MSI	K8NNEO2PLAT	$155	MSI K8TNEO2FIR	$139

PROCESSORS

INTEL Socket 478 (Pentium 4 800FSB)					
2.6GHz	512k	$199	3.0GHz	1MB	$249
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3.2GHz	512k	$309	E3.2GHz	2MB	$1039
3.4GHz	512k	$479	E3.4GHz	2MB	$1099
2.8GHz	1MB	$199			
Socket T (LGA 775)					
2.8GHz -520	1MB	$189	3.4GHz-550	1MB	$469
3.0GHz -530	1MB	$249	3.6GHz-560	1MB	$729
3.2GHz -540	1MB	$319			
AMD					
Socket 754					
A64 3000+	64 Bit	$249	A64 3200+	64 Bit	$319
A64 3400+	64 Bit	$469	A64 3700+	64 Bit	$789
Socket 939					
A64 3500+	64 Bit	$559	A64 FX-53	64 Bit	$909
A64 3800+	64 Bit	$789			

MEMORY

DUAL DDR MEMORY		
CMX512-3200XLPT	PC-3200 2-2-2-5 DDR 512Mb XMS3200	$179
CMX512-3200XL	PC-3200 2-2-2-5 DDR 512Mb XMS3200	$179
TWINX1024-3200XL	PC-3200 2-2-2-5 DDR 1024Mb XMS3200	$359
TWINX1024-3200XLPRO	PC-3200 2-2-2-5 DDR 1024Mb XMS3200	$379
OCZ400512ELDC-K	PC-3200 EL Channel 512Mb 400Mhz	$159
OCZ4001024ELDC-K	PC-3200 EL Channel 1G 400Mhz	$299
OCZ433512ELDC-K	PC-3500 EL Dual DDR 512Mb 433Mhz	$185
OCZ4331024ELDC-K	PC-3500 EL Dual DDR 1G 433Mhz	$349
OCZ466512ELDC-K	PC-3700 EL Dual DDR 512Mb 466Mhz	$169
OCZ4661024ELDC-K	PC-3700 EL Dual DDR 1G 466Mhz	$335
OCZ500512ELDC-K	PC-4000 EL Dual DDR 512Mb 500Mhz	$175
OCZ5001024ELDC-K	PC-4000 EL Dual DDR1G 500Mhz	$297
OCZ533512ELDC-K	PC-4200 EL Dual DDR 512Mb 533Mhz	$235
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Maxtor	120GB	7200rpm	ATA 133	6Y120P0	$99
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Maxtor	160GB	7200rpm	SATA	6Y160M0	$125
Maxtor	250GB	5400rpm	ATA 133	5A250J0	$205
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Seagate	120GB	7200rpm	SATA	ST3120026AS	$109
Seagate	160GB	7200rpm	SATA	ST3160023AS	$120
WD	120GB	7200rpm	ATA/SATA	WD1200JB/JD	$99/$109
WD	200GB	7200rpm	ATA/SATA	WD2000BB/JB	$135/$145
WD	250GB	7200rpm	ATA/SATA	WD2500JB/JD	$209/$219
WD	250GB	7200rpm	ATA/SATA	WD2500SB/SD	$239/$249
WD	36GB	10000rpm	SATA	WD360GD	$139
WD	74GB	10000rpm	SATA	WD740GD	$209
IBM	80GB	7200rpm	SATA	13G0252	$85
IBM	160GB	7200rpm	SATA	13G0254	$119
IBM	250GB	7200rpm	SATA	13G0255	$205

VIDEO CARDS

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Asus	Radeon X800Pro	$519	Visiontek	Radeon X800 Pro	$419
Asus	Radeon X800XT	$589	Asus	Radeon 9800XT	$439
ATI	Radeon X800XT	$559	ATI	Radeon 9800Pro	$289
Celestica	Radeon X800XT	$559	ATI	Radeon 9800XT	$489
Celestica	Radeon X800Pro	$439	Celestica	Radeon 9800XT	$489
MSI	Radeon X800 PRO	$489	Celestica	Radeon 9800Pro	$289
NVIDIA					
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Gainward	PCX5900 PCI-E G.S	$249	EVGA	6800 128MB	$329
Gainward	PCX5900 PCI-E	$239	EVGA	6800 GT 256MB	$449
Gigabyte	PCX5750 PCI-E	$159	Gainward	6800 GT Golden	$439
Gigabyte	PCX5900 PCI-E	$249	Gainward	6800 GF Ultra	$529
MSI	PCX5750 PCI-E	$159	Gainward	6800 GF Ultra G.S.	$549
MSI	X600XT PCI-E	$219	MSI	6800 ULTRA 256MB	$619

SOUND CARDS

Creative	Audigy 2 ZS	$96
Creative	Audigy 2 ZS Gamer	$116
Creative	Audigy 2 ZS Platinum	$176
Creative	Audigy 2 ZS Platinum Pro	$226
Gainward	Hollywood@Home™ 7.1	$39

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Coolermaster	Liquid Cooling Aquagate	$209
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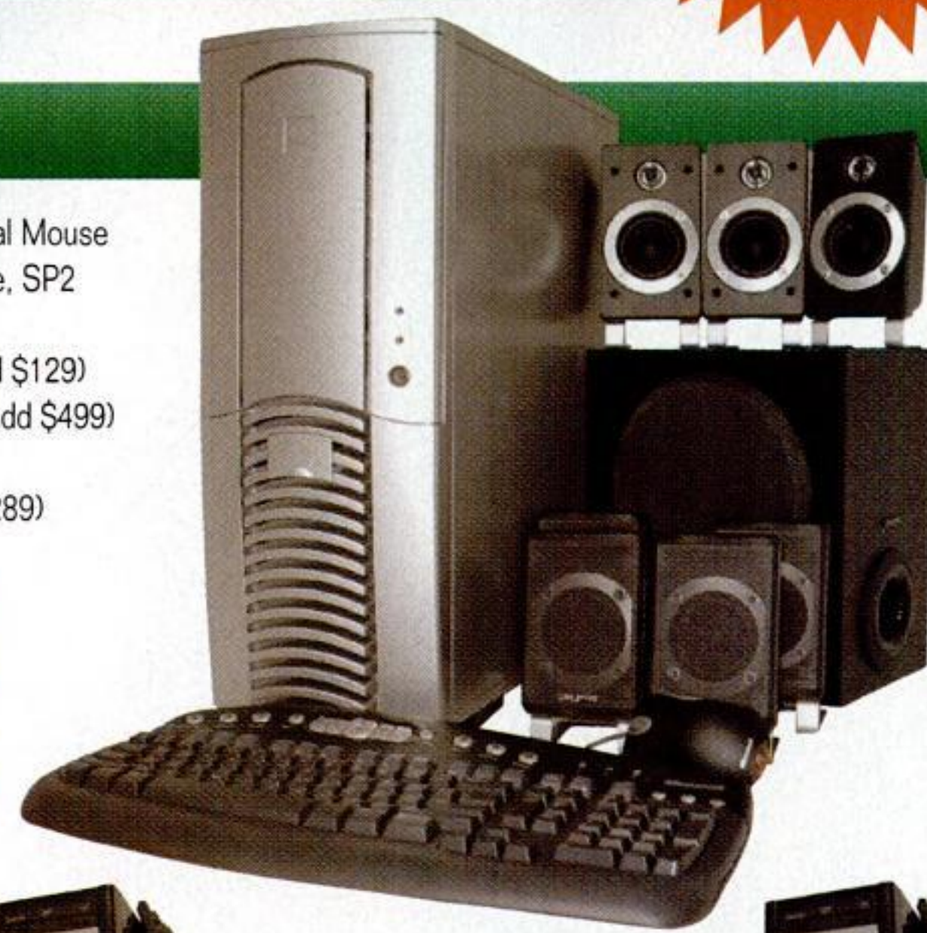

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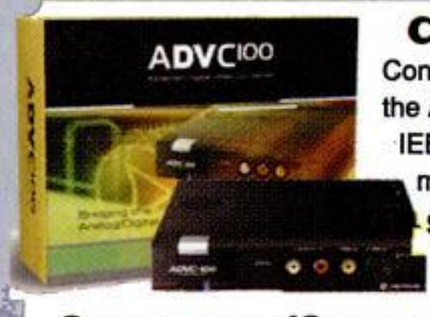

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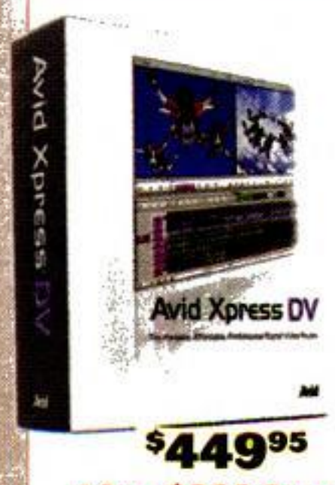

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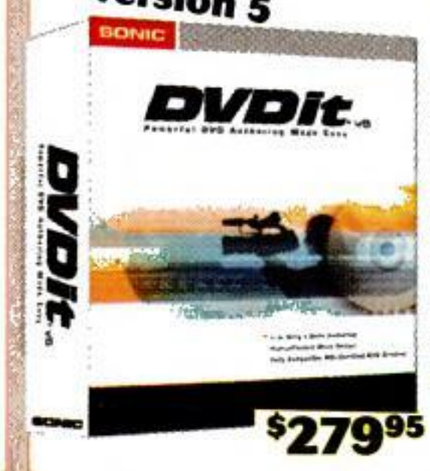

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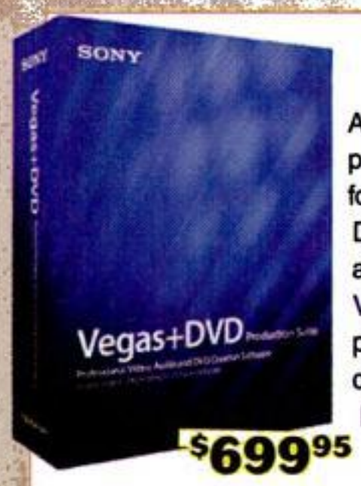

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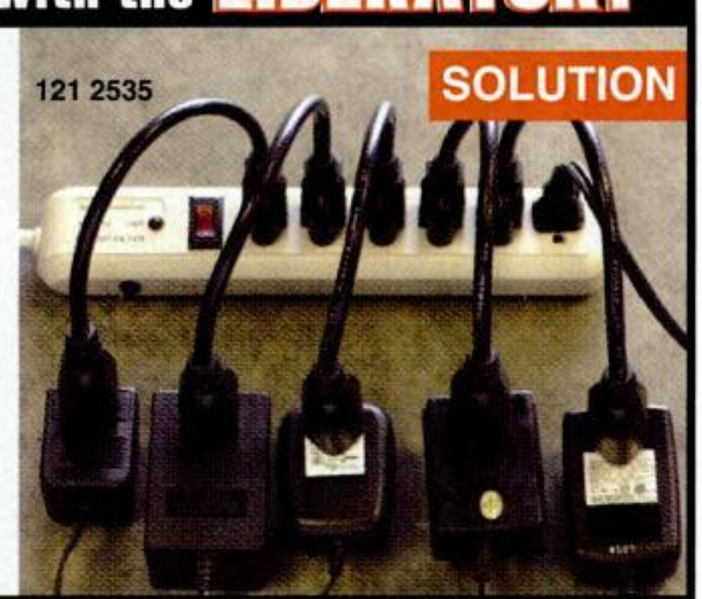
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MAXIMUM PC Rig of the Month

THIS MONTH: Jason Catanzaro's St. Anger

Put yourself in the shoes of a PC nut who has recently completed an arduous computer mod with all the bells and whistles, only to have the whole lot of it lost to a faulty water-pump. You'd be pissed. You might even turn your back on the practice of modding altogether. Or, like Jason Catanzaro, you might seek vengeance—rock'n'roll-style. (Everyone, devil-horn salute! Yea-aah!).

As though divined by metal gods Metallica, Catanzaro mustered the vision and will to create St. Anger—a PC that surpasses the achievements of its predecessor, is outfitted with an even more elaborate water-cooling system, and simultaneously pays tribute to the band whose music and spirit spurred him on.

It looks tough, too—all fire and brimstone with its simulated stained-glass window, red accenting, and serious bolt action (OK, stainless steel screws). Using a projector, Catanzaro was able to trace Metallica's most recent cover art onto the Plexiglas side-window. He then retraced the design using a product called Magic Medium Leading, followed by a wash of red and orange stain.

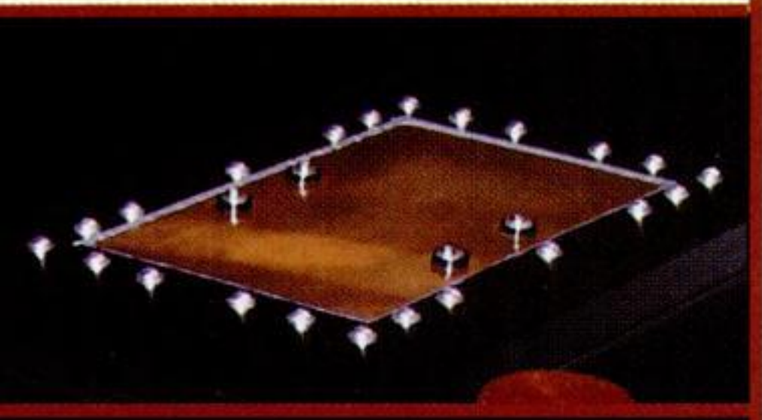
Righteous!

If you have a contender for Rig of the Month, e-mail **input@maximumpc.com** with pics and a brief write-up.

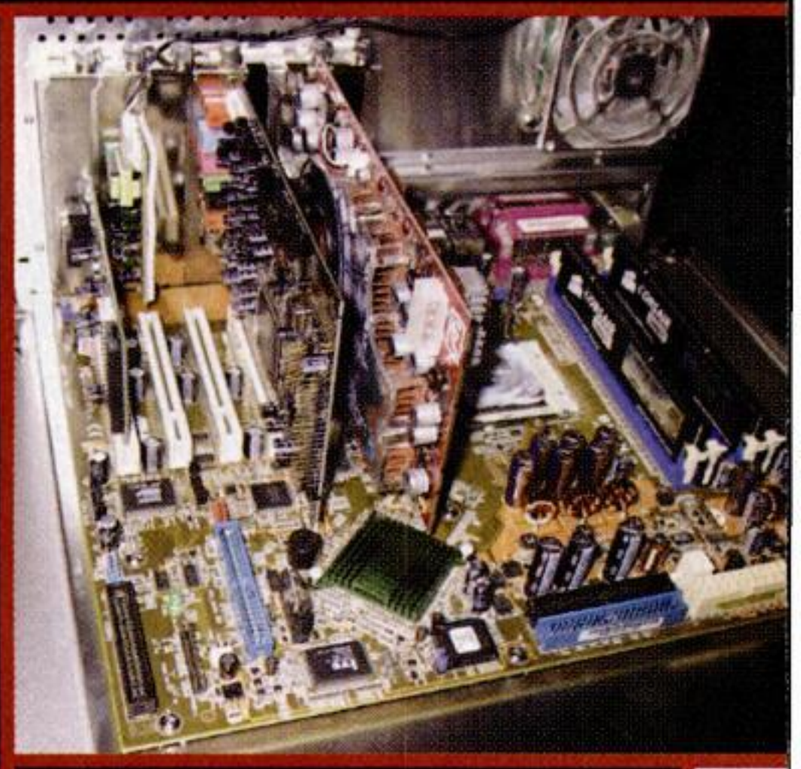
We're guessing that this box of pent up rage would do Metallica proud—provided the PC isn't housing any bootlegged MP3s.

Catanzaro cut the grill out of the case's front panel to intensify the glow of the red LED fans inside. A transparency of the band affixed to 1/4-inch Plexiglas makes for an effective substitute.

Visible in this picture are an Innovatek reservoir and convection radiator. On/off valves beneath the reservoir allow the cooling panel to be removed without having to drain the whole setup.



Sandwiched between a copper plate at the top of the case and an Innovatek hard drive water block inside are two 80mm thermoelectric coolers, making the aluminum case one big, badass heatsink.



Load-out: an Athlon 64 FX 51, Radeon 9800 XT, two Maxtor SATA 80GB with 8MB buffer in RAID 0, and a gig of Corsair dual-channel DDR.

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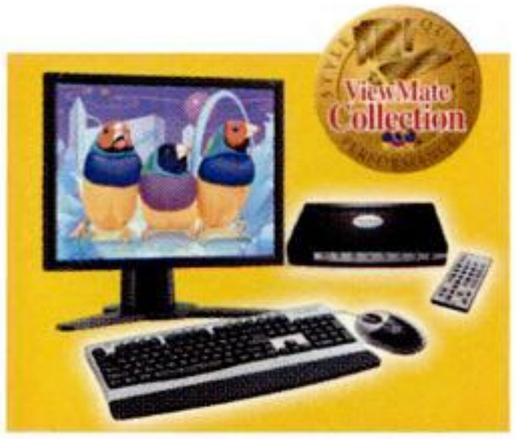

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